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HEROIN, DEMEROL, AND HYOSCINE IN LABOUR

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IN November, 1946, the two senior residents in Obstetrics at the Grace Maternity Hospital, Halifax,* began an investigation into the relative merits of heroin and demerol when used in combination with hyoscine to alleviate the pain of the first stage of labour. Up until this time, heroin was generally the analgesic of choice in this hospital. With the excellent reports appearing in the literature on the merits of demerol,^{1,2} it was felt that a comparison of the two drugs should be made. It is the purpose of this paper to report the results of our studies on 300 cases.

PHARMACOLOGY

Heroin: or diacetyl-morphine, is a synthetic morphine derivative with the same general properties as morphine. Its manufacture is forbidden in the United States because of the ease with which addiction to it occurs "due to intense euphoria which often supplants subjective depression, and the absence of unpleasant side-actions such as vomiting and constipation".³ This fear of addiction would appear unwarranted in obstetrics, since the patients do not know what drug they are receiving, and the dosage used in our routine of heroin gr. $\frac{1}{8}$ was not repeated.

Heroin and morphine are both analgesics and respiratory depressants. Their analgesic properties differ in that the action of heroin appears much more quickly and is of shorter duration than morphine, and it is four to eight times as potent as morphine in this respect.³ The analgesia appears within ten to fifteen minutes after the injection of heroin and reaches its peak within thirty minutes. For about two hours there will be maximum relief from pain, with the effect gradually diminishing over the next one to two hours.⁴

SeEVERS and Pfeiffer concluded that "... Heroin is unquestionably superior to other drugs (morphine, dilaudid, and codeine) from the subjective standpoint. . . . For the relief of acute pain as in childbirth where a minimum of subjective depression is desired, this type of compound has a laudable action, and its use would appear justified."⁵ Goodman and Gilman state that morphine has no direct effect on uterine muscle as used in obstetrics, and we observed no decrease in the frequency, duration, or intensity of the uterine contractions with heroin.

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Demerol.—Demerol hydrochloride is a relatively new synthetic drug which, although it has no direct chemical relation to morphine or atropine, is supposed to combine the analgesic properties of the former with the antispasmodic properties of the latter. Its analgesic power is said to rank between morphine and codeine and its antispasmodic action on smooth muscle to be due partly to a depression of the parasympathetic nerve endings and partly to a direct action on the muscle.

Although generally well tolerated in therapeutic doses, unpleasant side reactions may occur, particularly if given intravenously, such as dizziness, nausea, vomiting, extreme weakness, syncope, profuse perspiration, and dryness of the mouth. In 1,000 cases, Schumann found that the only untoward maternal effects appeared in the intravenous group. He stated "that with the exception of transient nausea appearing in one-fourth of the cases no further side-effects were seen when the drug was administered slowly, taking two minutes by the clock to inject 2 c.c. (100 mgm.).² Compared with morphine, respiratory depression is said to occur very rarely. Although addiction has been reported, it has been stated that demerol is the least likely of the opiates to produce physical dependence.

Hyoscine.—A member of the belladonna group and generally considered to be the amnesic drug of choice in obstetrics. It differs from atropine in that atropine first stimulates and then depresses the brain, whereas hyoscine is a primary depressant and therapeutic doses normally cause drowsiness, fatigue, and dreamless sleep.³ Even with therapeutic doses patients may become restless, excited, and irrational, although some of these effects may be due to an idiosyncrasy to the drug. Its action on uterine muscle is of little consequence.³ Hyoscine is generally considered to be a respiratory depressant and to pass into the fetal circulation with a similar effect.

METHODS

Three routines of medication were adopted and 100 patients, both private and ward, were placed on each of these for the purpose of the study.

Group "A".—Heroin gr. $\frac{1}{8}$ and hyoscine gr. $\frac{1}{150}$ when patient begins to mind her pains. Hyoscine gr. $\frac{1}{150}$ in one hour, and then gr. $\frac{1}{300}$ q. 2-3 h., p.r.n.

Group "B".—Demerol 100 mgm. and hyoscine gr. $\frac{1}{150}$, when patient begins to mind her pains. Hyoscine gr. $\frac{1}{150}$ in one hour, and then gr. $\frac{1}{300}$ q. 2-3 h., p.r.n.

Group "C".—Demerol 100 mgm. and hyoscine gr. $\frac{1}{150}$ when patient begins to mind her pains. Demerol 100 mgm. in one hour, and then 100 mgm. q. 2-3 h., p.r.n.

It was impossible to avoid a certain amount of selection in placing a patient on one of the three routines described above for the follow-

ing reasons: (1) individual preference of the courtesy staff for their private patients; (2) prescribing of additional or different medication from the above by the private doctors, thereby eliminating the patient from the series.

Before any medication was started the resident or the intern examined the patient and charted the maternal blood pressure, pulse, and respiration, and the intensity, frequency, and duration of the pains. These recordings were repeated and charted before each subsequent medication. If it was estimated that the

TABLE I.
HOSPITAL AND MARITAL STATUS.

Drugs	Private	Ward	Married	Single	Total
Heroin-hyoscine (Rep. hyoscine).	44	56	75	25	100
Demerol-hyoscine (Rep. hyoscine).	34	65	66	33	99
Demerol-hyoscine (Rep. demerol)..	32	68	70	30	100

patient would deliver within three to four hours the medication was not repeated, and as will be shown later, our results in this respect were rather disappointing.

After the birth of the baby, the time of the first breath, first cry, and good colour, were recorded as was the duration of the labour. The majority of our patients are delivered

Parity and duration of labour.—The following figures are presented for comparison with other series. Little significance is attached to our figures for duration of labour since (1) our groups are small in number so that a few cases of prolonged labour seriously affects the average; (2) the time of onset of labour was charted by the nurses, often when the patient was in strong labour, and is therefore apt to be inaccurate. As Schumann states “. . . data on the duration of labour need be regarded with reservation for it is indeed difficult to appraise accurately the time of onset of labour”.²

Blood pressure, pulse, and respiration.—These were recorded routinely before each medication. A detailed statistical study was not made of the results, but no characteristic or significant effect was noted with the three drugs employed.

Undesirable side-actions.—Hyoscine is noted for the restlessness, excitement, and irrational behaviour it may produce when given in single or repeated doses to women in labour. This was confirmed in the three series of medication herein reported. However, with the dosages and schedules we employed, only two patients of the heroin-hyoscine group, and one patient in the demerol-hyoscine group, repeating the

TABLE II.
PARITY AND DURATION OF LABOUR.

Drugs	No. of cases		Duration of labour	
	Primipara	Multipara	Primipara	Multipara
Heroin-hyoscine (repeated hyoscine).....	74	26	18.05 hr.	15.58 hr.
Demerol-hyoscine (repeated hyoscine).....	56	43	20.02 hr.	13.02 hr.
Demerol-hyoscine (repeated demerol).....	61	39	17.25 hr.	13.10 hr.
Demerol-hyoscine (Schumann).....	1,000 cases		12.4 hr.	7.6 hr.
Barbiturates-hyoscine (Rathbun).....	500 cases		14.9 hr.	8.8 hr.
Pantopon-hyoscine (Irving <i>et al.</i>).....	100 cases		23.46 hr.	13.24 hr.

under open ether given with the pains, although a fair proportion of the primiparae are delivered under local anaesthesia. The degree of analgesia was estimated by the resident as complete, good, fair, and poor. At the end of eighteen to twenty-four hours, the patients were questioned as to amnesia, recorded as complete, good, fair, or poor, the criteria for which will be noted later.

RESULTS

For the reasons stated above, ours were not strictly random groups, as a certain amount of selection was unavoidable. However, we feel they are similar enough to allow for comparison.

hyoscine, required constant nursing supervision and restraint. The combination of heroin-hyoscine was the worst offender, and we feel that individual idiosyncrasy and threshold to the drugs must play a very important part, since many patients receiving an equal amount or more sedation than the patients noted in Table III did not exhibit any untoward reactions.

With demerol the only untoward symptom was an increased tendency to nausea and vomiting.

Maternal and fetal mortality.—There was one maternal death, two stillborn, and one neonatal death in the 300 cases, none of which

could be directly attributed to the sedation used. The one maternal death was due to a spontaneous inversion of the uterus in a 19-year old primipara. One stillbirth was associated with a ruptured uterus in the second stage of labour. The other stillbirth was an eight pound eleven ounce baby arrested in the low transverse. A manual rotation was performed, and the head extracted, but great difficulty was experienced with the shoulders, the cord being around the posterior shoulder. The mother had received demerol-hyoscine at 3.10 p.m. and the baby was not born until 10.40 p.m. The neonatal death was associated with a spina bifida.

the patient obtained complete or marked relief from the pain of labour, but might be able to recall events in sequence twenty-four hours after labour. Thus, labour to this group was either a vague memory or a pleasant memory associated with little or no pain.

2. *Fair: Fair amnesia and analgesia.*—The patients had some idea of an orderly sequence of events occurring in the labour room, and obtained partial relief from the labour pains. They remembered labour as a not unpleasant experience.

3. *Poor: Little or no amnesia or analgesia.*—This group remembered labour almost fully, and as a painful experience.

TABLE III.
SIDE-ACTIONS OF DRUGS

Drugs	Restless and mildly excited	Moderately excited and irrational	Totally irrational	Total
Heroin-hyoscine (repeated hyoscine).....	14	4	2	20
Demerol-hyoscine (repeated hyoscine).....	4	5	1	10
Demerol-hyoscine (repeated demerol).....	3	1	0	4

TABLE IV.
ANALGESIA AND AMNESIA

Drugs	Satisfactory	Fair	Poor	Total
Heroin-hyoscine (repeated hyoscine).....	81	10	9	100
Demerol-hyoscine (repeated hyoscine).....	68	16	15	99
Demerol-hyoscine (repeated demerol).....	69	16	15	100

TABLE V.
ANALGESIA AND AMNESIA.

Drugs	Analgesia				Amnesia			
	Comp. or good	Fair	Poor	Total	Comp. or good	Fair	Poor	Total
Heroin-hyoscine (repeated hyoscine).....	76	21	3	100	44	35	21	100
Demerol-hyoscine (repeated hyoscine).....	55	40	4	99	46	28	25	99
Demerol-hyoscine (repeated demerol).....	61	33	6	100	39	33	28	100

Analgesia and amnesia.—For the purpose of this study we considered as satisfactory any patient who had complete or good amnesia; or complete or good analgesia with varying degrees of amnesia. Our classification thus resolved itself as follows:

1. *Satisfactory: (a) Complete or good amnesia.*—Included in this group were patients who could recall isolated events in the labour room, but had no idea of sequence, and little or no pain. (b) Complete or good analgesia with varying degrees of amnesia. In other words,

Thus 81% of the patients receiving heroin-hyoscine, with repeated doses of hyoscine were classified as obtaining "satisfactory" relief from the pains of the first stage of labour, as compared with 68% for the demerol-hyoscine repeating the hyoscine, and 69% for the demerol-hyoscine repeating the demerol.

Statistically comparing the "satisfactory" results against the "fair" and "poor" results in the three routines the difference is significant, and in favour of the heroin-hyoscine group. This is perhaps even more significant

when it is noted in Table II that the number of primiparæ in the heroin-hyoscine routine is greater than in the other two routines. In all three groups, the patients achieved the "satisfactory" class through good analgesia more so than good amnesia (Table V). In other words, the analgesic powers of the drug used in these three series appeared to be more beneficial to the patients than the amnesic powers, although in the demerol-hyoscine group, repeating the hyoscine, the analgesia more nearly approached the amnesia. The following table is presented to show the degree of analgesia and amnesia obtained within each of the three routines.

Statistically there is no significant difference comparing one routine against the others.

In an attempt to correlate the analgesia and amnesia with the total dosage of the medication received the following tables were computed.

Although the number of cases in the various groups in Tables VI, VII, and VIII is too small to be significant, it would appear that the trend is towards a more satisfactory result from the analgesic standpoint following the second doses of medication—for example, 80% of those patients receiving heroin gr. 1/8 and hyoscine gr. 1/150 with a repeated 1/150 gr. of

TABLE VI.
HEROIN-HYOSCINE—REPEATING HYOSCINE.

Dosage	Total cases	Analgesia			Amnesia		
		Comp. or good	Fair	Poor	Comp. or good	Fair	Poor
Heroin gr. 1/8, hyoscine gr. 1/150.....	27	77.7%	18.5%	3.7%	25.9%	33.3%	40.7%
Above plus hyoscine gr. 1/150.....	41	80.5%	19.5%	0%	43.9%	39%	17.1%
Above plus hyoscine gr. 1/300.....	20	65%	30%	5%	55%	40%	5%
Above plus hyoscine gr. 1/300.....	12	75%	16.7%	8.3%	66.7%	16.7%	16.7%
Total cases.....	100						

TABLE VII.
DEMEROL-HYOSCINE—REPEATING HYOSCINE.

Dosage	Total cases	Analgesia			Amnesia		
		Comp. or good	Fair	Poor	Comp. or good	Fair	Poor
Demerol 100 mgm., hyoscine gr. 1/150.....	45	51.1%	44.4%	4.4%	37.8%	35.6%	26.7%
Above plus hyoscine gr. 1/150.....	32	56.3%	37.5%	6.2%	53.1¼	25%	21.9%
Above plus hyoscine gr. 1/300.....	14	64.3%	35.7%	0%	64.3%	21.4%	14.3%
Above plus hyoscine gr. 1/300.....	5	60%	40%	0%	40%	20%	40%
Above plus hyoscine gr. 1/300.....	3	66.7%	33.3%	0%	66.7%	0%	33.3%
Total cases.....	99						

TABLE VIII.
DEMEROL-HYOSCINE—REPEATING DEMEROL

Dosage	Total cases	Analgesia			Amnesia		
		Comp. or good	Fair	Poor	Comp. or good	Fair	Poor
Demerol 100 mgm., hyoscine gr. 1/150.....	28	57.1%	39.3%	3.6%	35.7%	28.6%	35.7%
Above plus demerol 100 mgm.....	34	67.6%	26.5%	5%	41.2%	32.4%	26.5%
Above plus demerol 100 mgm.....	29	62.1%	27.6%	10%	48.3%	31%	20.7%
Above plus demerol 100 mgm.....	6	50%	50%	0%	16.7%	50%	33.3%
Above plus demerol 100 mgm.....	3	33.3%	66.7%	0%	0%	66.7%	33.3%
Total cases.....	100						

hyoscine and delivered, achieved "satisfactory" analgesia.

As would be expected the trend appears to be toward an increase in amnesia with each repetition of the hyoscine, in the two groups where this drug was repeated, and towards a decrease in the demerol-hyoscine group where the demerol was repeated, after the third dose of demerol (usually four to five hours after the initial dose) by which time the effect of the hyoscine would probably be minimal.

As a sample group the "poor" results with the heroin-hyoscine group were reviewed to see if there was any obvious reason why the medication had failed. Of the nine cases (Table IV) six would have been expected to have received the maximum benefit from the medication; two delivered before the medication had sufficient time to be of value; and one

exclusive as possible. After consultation with the pædiatricians on the staff of the Grace Maternity Hospital, it was felt that any baby who did not breathe spontaneously and rhythmically after three minutes of apnoea probably had cerebral damage. Our classification was as follows:

1. *Normal infant*.—Good muscular tone, good colour, and breathes spontaneously and rhythmically within one minute.

2. *Mild asphyxia*.—Infant of good muscular tone, with slight cyanosis, and breathes spontaneously and rhythmically within one to three minutes.

3. *Marked asphyxia*.—Infant of fair tone, but definitely cyanosed, and requires three to six minutes to establish rhythmical respirations with the usual resuscitation measures.

4. *Severe asphyxia*.—Any infant that required over six minutes to establish rhythmical respirations, including those babies of fair tone but apnoeic for over six minutes, as well as those babies obviously in shock.

The asphyxiated cases were broken down into (1) those we believed were due to the

TABLE IX.
ASPHYXIA NEONATORUM

Drugs	Cause of asphyxia	Mild	Marked	Severe	Total cases
Heroin-hyoscine.....	Medication.....	0	5	0	5
Repeated hyoscine.....	Complications.....	1	0	1	2
(100 babies).....	Medication plus complications...	1	2	0	3
	Total.....	2	7	1	10
Demerol-hyoscine.....	Medication.....	1	2	1	4
Repeated hyoscine.....	Complications.....	0	1	0	1
(100 babies).....	Medication plus complications...	0	2	1	3
	Total.....	1	5	2	8
Demerol-hyoscine.....	Medication.....	4	4	0	8
Repeated demerol.....	Complications.....	1	0	0	1
(98 babies).....	Medication plus complications...	2	1	1	4
	Total.....	7	5	1	13

delivered ten hours after the initial medication, and seven hours after the last medication. On the other hand a considerable number of patients achieved a "satisfactory" result when, on the basis of the expected duration of the analgesic and amnesic powers of the drugs, a poor result would have been expected. Thus, as other observers have pointed out,⁴ the patient's reaction to the drugs, their threshold of pain, and their psychic reaction to pain, probably play a very important part in the results achieved with any type of medication used to alleviate labour pains.

Asphyxia neonatorum.—Realizing that in evaluating any drugs used for obstetrical analgesia and amnesia, the effect on the fetus in terms of asphyxia is of prime importance, we attempted to make our classification as in-

medication only; (2) those due to operative interference or other complications (*e.g.*, key-in-lock, manual rotation, face-to-pubes forceps, and cord around the neck, etc.); (3) those probably due to a combination of (1) and (2).

Thus with heroin-hyoscine, repeating the hyoscine, we had ten asphyxiated babies, five of which were undoubtedly due to the medication, and in three the medication probably played a part. All of the cases due to the medication were of the "marked" type of asphyxia. With demerol-hyoscine, repeating the demerol, the rate was somewhat higher—eight and four babies respectively, but of the eight babies four were of the "mild" type of asphyxia and four of the "marked" type. The rate was the lowest with demerol-hyoscine, repeating the hyoscine—four and three babies

respectively with two of the four babies of the "marked" type of asphyxia, one "mild" and one "severe".

The differences in the figures for asphyxia in Table IX between three routines of medication are not great enough to be significant statistically. There does, however, appear to be a trend towards more asphyxiated babies with the demerol-hyoscine routine when the demerol is repeated.

We also computed the time interval between the initial dose of medication, or the repeated dose, and the birth of the baby. We had attempted, as stated earlier, to withhold the drugs if the delivery was expected within three to four hours, under the impression that this was the most dangerous period for the administration of the medication from the viewpoint of asphyxia. Our attempts to estimate the ex-

may be the reason why asphyxia occurred in some of our babies and not in others.

Since the dosage of the drugs used in this series was standard for all women, the weights of both the mothers and the asphyxiated babies were checked, but no significant variations from the normal occurred to suggest this as a factor in the asphyxia.

CONCLUSIONS

1. Of the three routines described in this paper, the heroin-hyoscine group proved to be the most effective from the standpoint of analgesia and amnesia. In many instances we felt that we probably could have repeated the heroin, in a smaller dosage, without any undue risk to the baby.

2. Heroin and hyoscine, repeating the hyoscine, should not be used except in a hospital

TABLE X.
MEDICATION AND TIME OF DELIVERY

Drugs	Birth within 4 hrs. of initial medication		Birth within 4 hrs. of a rep. medication		No medication within 4 hrs. of birth	
	No. of babies	No. with asphyxia	No. of babies	No. with asphyxia	No. of babies	No. with asphyxia
Heroin-hyoscine repeated hyoscine.....	32	3	23	4	45	3
Demerol-hyoscine repeated hyoscine.....	50	2	18	3	32	3
Demerol-hyoscine repeated demerol.....	44	9	30	2	24	2
Total.....	126	14	71	9	101	8

pected time of delivery were very disappointing as is borne out by Table X.

It is generally agreed that the second and third hours after the administration of analgesics or amnesics are the most productive of asphyxia neonatorum. It is therefore surprising to us that there were not more asphyxiated babies in all three of our groups where asphyxia would be expected.

The timing of the administration of drugs with respect to the birth of the baby is important. However, our figures would suggest that the many other factors which may enter into the production of asphyxia neonatorum and are difficult to measure, such as the trauma of labour, the final anaesthetic, mild degrees of dystocia, and susceptibility to the drugs administered, are even more important. The combination of one or several of these factors with the drugs used in our routines

with adequate nursing supervision, because of the excitement, restlessness, and irrational behaviour it may produce.

3. It has been stated that demerol has no depressant effect on the fetus. Statistically, in the three routines described above, there was no significant difference in the percentage of asphyxiated babies. However, the trend was towards more cases of asphyxia in the routine of demerol-hyoscine where the demerol was repeated.

4. It is suggested that the variable factors which may enter into the production of asphyxia neonatorum and are difficult to measure, such as the trauma of labour, and the final anaesthetic, mild degrees of dystocia, and susceptibility to the drugs administered, may be more important than the timing of the drugs administered for sedation.

5. There were no maternal or fetal deaths in this series which could be directly attributed to the medication used.

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RÉSUMÉ

Ayant fait l'expérience de diverses combinaisons d'héroïne, de démérol et d'hyoscine pour l'analgésie et l'amnésie pendant le travail, les auteurs reconnaissent la supériorité d'une association héroïne-hyoscine. Ils ne croient pas que l'action dépressive de l'héroïne soit dangereuse pour l'enfant. Cependant, à cause de l'état d'agitation qu'il produit chez la mère, ce traitement ne convient qu'à un milieu hospitalier. Quant au démérol, surtout dans le cas d'une seconde injection, il tend à augmenter la fréquence de l'asphyxie chez les nouveau-nés. Cependant, celle-ci ne dépend pas seulement de la médication analgésique, mais aussi de la durée du travail, de la dystocie, et de l'anesthésique employé au moment de l'expulsion. La présente série de 300 cas a comporté un décès maternel, deux enfants mort-nés et un décès après la naissance; aucun de ces décès ne paraît mettre en cause la médication analgésique.

PAUL DE BELLEFEUILLE

INJURIES TO THE BILE DUCTS—THEIR PREVENTION AND REPAIR*

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INJURIES to the bile ducts following operations on the extra-hepatic biliary apparatus provide some of the most serious and difficult problems encountered in abdominal surgery.

When one realizes that such strictures or fistulae, as may occur, are the result of errors in technique or of difficulties encountered during the removal of a gall bladder, adherent and distorted by long-standing disease, one may be pardoned for reiterating what has been said so often before, namely, that the most careful identification of the structure situated at the confluence of the cystic and common hepatic ducts is an absolute necessity in the surgery of this region. It is no less imperative that the ducts be inspected carefully for evidence of injury or bile leakage, and their integrity determined before the abdomen is closed. While injury to the bile ducts may be viewed even

charitably under some circumstances, failure to recognize and to repair the defect before completing the operation is a grave indictment.

In order to appreciate the gravity of such a situation, the statement of one authority may be recalled. Of patients who sustain injury to the bile ducts, one-third die soon after operation, and another third die from the operative measures undertaken later to repair the damage. Of the remaining third who recover from the secondary operation with good immediate results, many suffer from recurrent attacks of pain, jaundice and fever, until death relieves their sufferings.

Under present day circumstances, the results of late repair of these injuries may be said to be slightly more encouraging, but no matter what improvements in technique are developed, nor what new material may be used to bridge the defect, the operation of late repair will always be a formidable undertaking fraught with serious risk to the patient. Furthermore, the anatomical dissection and repair will continue to tax the ingenuity and skill of the surgeon.

The problem under consideration is, therefore, a most serious one. It is, however, really more than just another surgical problem. It stands as a challenge to all of us who are interested in abdominal surgery and it is of real concern to the internists who refer these patients for surgery. For purposes of presentation, it is planned to arrange the discussion of this problem under these divisions: (1) Prevention of injury to the bile ducts. (2) Immediate recognition of injury with methods adopted for its repair. (3) Late repair of injury to the bile ducts.

PREVENTION OF INJURY TO THE BILE DUCTS

(a) *Earlier operation in gall stone disease.*—

The all-too-common habit of permitting patients to endure repeated attacks of colic should no longer be acceptable. It cannot be denied that the most important element in the production of hazards in biliary tract surgery is that of unwarranted delay.¹ Surgical technique has improved immensely, great advances in operating-room facilities and anaesthesia have been made, and possibilities for early diagnosis have been improved. The dangers of hæmorrhage and pulmonary complications are better understood, if not completely mastered. The removal of the ordinary gall bladder is no

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longer a difficult matter for the competent surgeon. His chief concern is the exercise of ordinary care and the avoidance of injury to structures distorted or occupying anomalous positions. Nevertheless, the surgical morbidity and mortality, outside of a few notable exceptions, remain at a level which is not completely satisfactory. It is the gall bladder where the complications are full blown that provides the difficulties which may lead to a fatal outcome. Cholecystectomy for stones associated with a minimum of pericholecystitis is a relatively simple and safe operation provided the surgeon is not hurried. A similar procedure in a sick, obese, elderly patient whose gall bladder or cardiac condition is many times worse than it should have been because of delay in obtaining surgical relief, is a major undertaking. The time required for the operation is important in such a case. In his haste, the operator may fail to obtain proper exposure and thus fail to visualize the important adjacent structures, injury to which is so serious.

(b) *Anæsthesia*.—Surgery on the biliary tract should be performed under optimum muscular relaxation. At the present time intratracheal ether anæsthesia, continuous spinal, or cyclopropane with curare are available for this purpose. A plea for the anæsthetist is in order at this point. The surgeon should always allow the anæsthetist sufficient time for proper induction before proceeding with the operation.

(c) *Adequate exposure*.—Nowhere is the necessity for adequate exposure better illustrated than in biliary tract surgery. It usually demands a paramedian muscle-splitting or reflecting incision from a point below the xiphisternum to another point just below the level of the umbilicus. The actual length of the incision will vary with the thickness of the abdominal wall and one should never endanger the precision of one's dissection by attempting a difficult task through a small incision. For several years I used the subcostal incision of Kocher almost exclusively for gall bladder surgery, but now I reserve it for special circumstances. In large people with a very wide costal angle and in whom the abdominal musculature is attenuated, a transverse incision is of distinct advantage to the patient during the stage of wound healing. By adequate exposure is implied free mobilization and division of any adhesions formed through inflammation or pre-

vious operation, and full exposure of Morrison's pouch. This leads one, naturally, to the foramen of Winslow and thus to the common bile duct. In cases of difficulty, sharp dissection is recommended. An approach by any other way is time-consuming, often bloody, indecisive and dangerous.

(d) *Technique of cholecystectomy and choledochotomy*.—When the gall bladder and common duct are further exposed by retracting the duodenum downwards, forwards, and to the left, their examination is completed, and a decision must be made whether or not to open and explore the bile ducts. The necessity for doing so depends upon a history of previous jaundice, the actual presence of jaundice, a thickened or dilated duct, a thickened and contracted gall bladder, or palpable stones within the ducts. The duct is explored, also, whenever there is the slightest doubt regarding the patency of its lumen.

When it is indicated, the common duct is opened and explored, as a rule before removal of the gall bladder, because not only am I anxious to assure myself of its patency at an early stage in the operation, but also the presence of a tube across the junction of the cystic with the common duct is an additional safeguard against injury. In exploring the duct and after removing any stones, the final step is to pass a probe up the common hepatic to the right and left hepatic ducts, and then down the common duct to the duodenum. I am satisfied with a dilatation of the ampulla to 5 mm., and am convinced it should never exceed 7-8 mm. I use a T-tube which I prepare by cutting the crosspiece to a length appropriate to the individual case and also by slotting it. Cholecystectomy is next performed. Whether this is done from the cystic duct outwards or from the fundus downwards, is not a matter of great moment. Either method may be used to advantage under certain circumstances. The former perhaps is preferable, as most bleeding is controlled when the cystic artery is clamped. The point to emphasize is the anatomical dissection of the cystic duct and artery. These should be exposed, clamped and tied separately with careful regard to the right hepatic artery which is sometimes a very close relation. Where the technical difficulties of cholecystectomy are such that an arduous and prolonged operation would be required and the integrity

of the ducts likely to be jeopardized, especially with a patient in poor condition, a cholecystostomy may be favoured in order to decompress the biliary tract and permit the liver to recover from its depressed state by external drainage. Rarely, and under circumstances where the structures are hopelessly involved by dense adhesions, the removal of the greater portion of the infected gall bladder down to a level close to the cystic duct (partial cholecystectomy) may be all that can be safely achieved.

If there is difficulty in performing cholecystectomy, it usually occurs at the stage when the cystic duct is being dissected. Here the cystic artery may be torn or perhaps the ligature slip and the field flooded with blood. A hasty manoeuvre with poor visualization may result in the instrument closing over a portion or all of the right hepatic or common bile duct. There is no need for undue concern, for such hæmorrhage can always be controlled instantly by compressing the hepatic artery against a finger in the foramen of Winslow. Accurate rather than quick control of the artery is the essential point.

One frequently observes a case with a very short cystic duct with the gall bladder draining almost directly into the common duct. If the latter is normal in size and easily angulated as the gall bladder is lifted away, the common duct may resemble the cystic duct and the angulated portion be caught in the clamp before the error is recognized. Beware of the easy case. The common bile and the common hepatic ducts should be dissected free of their peritoneum above and below what one believes to be the junction of the cystic and common hepatic ducts before the former is clamped.

(e) *Ducts and arteries.*—The anomalies of the hepatic and cystic ducts and arteries have been studied extensively. The possibility of variations from the normal provides always a dangerous hazard in performing surgery of the gall bladder. The great danger, of course, is that an anomaly may pass unnoticed either through unnecessary haste or because the situation is too obscured by the effects of disease to permit a ready view of the involved structures.

In about 75% of cases, the cystic duct joins the hepatic duct at something like a right angle. In 17%, the ducts pursue a parallel course before they unite. They are bound together by

fibrous tissue and it may be possible to dissect them from each other for as much as two inches or more. The point of actual union may be behind the duodenum and within 0.5 to 1 cm. from the ampulla. In 8%, the cystic duct spirals in front of the hepatic duct before they unite, or the cystic duct may run for a distance behind the hepatic and enter its left side.

An accessory bile duct is found in 18% of cases. It usually arises from the right lobe of the liver and at first lies at a deeper plane than the cystic duct. The accessory duct may join the right hepatic duct at a relatively high level and be out of danger. Or, it may join with the common hepatic duct at a low level, near or at that of the cystic duct, and thus be exposed to injury.

Normally, the hepatic artery lies to the left of the common duct, and divides near the liver into the right and left hepatic arteries, the right passing behind the common hepatic duct. The cystic artery, which is a branch of the right hepatic, is normally a superior relation of the cystic duct, lying between it and the liver. Anomalies may occur with regard to one or other of these vessels. *The right hepatic artery* may be double; it may arise from the superior mesenteric artery or elsewhere; it may cross the common hepatic or bile duct; or it may lie parallel to, and in close relation to, the superior or posterior aspects of the cystic duct. *The cystic artery* arises from the gastroduodenal artery or some other branch of the hepatic trunk and this crosses in front of the common duct. It may arise to the left of the common hepatic duct and cross in front of or behind it, or it may be double, the accessory artery arising from one of the branches of the hepatic trunk.

Although I have described the important anomalies of the ducts and arteries which may occur and have indicated, in the case of the ducts, the frequency of their occurrence, I must emphasize that the essential points are familiarity and knowledge of all the possible anomalies. Percentages are of more interest to the anatomist and the pathologist and do not really concern the surgeon.

IMMEDIATE RECOGNITION AND REPAIR OF INJURY TO THE BILE DUCTS

(a) It has been emphasized that, following removal of the gall bladder and prior to placing a ligature on the cystic duct, the common duct should be inspected for leakage of bile

due to tear or other injury. The gall bladder specimen should be examined also to ascertain that only the cystic duct has been transected. Recognition of injury at this point provides, obviously, the best opportunity for the surgeon to repair the damage, even though retraction of the cut ends may lead to some little difficulty in their identification.

(b) Reconstruction of the duct should be affected by end-to-end anastomosis over a tube. Loose approximation, with interrupted fine silk sutures, is all that is required. The catheter or T-tube over which the repair is affected must never be brought out through the site of the injury. Finally, a Penrose drain should be placed down to Morrison's pouch. When a section has been taken out of the side of a duct, this must be repaired in such a way that there is no encroachment upon the transverse axis of the lumen.

(c) In the repair of a structure such as the common duct, one should resist the all too common tendency to place the largest possible catheter or T-tube into its lumen. The pressure exerted by a snug tube will, in itself, set in motion a series of events characterized by damage to the delicate endothelium of the duct, fibrosis and stricture. This warning applies to all circumstances of duct drainage and is, I believe, particularly important in view of the fact that the common duct is being opened, explored for stone and drained in an increasing number of cases.

(d) Sutures used in the repair or closure of any opening of the duct should not penetrate into its lumen. Fine a-traumatic needles and suture material are required. One need hardly emphasize a basic surgical principle: that the success of any anastomosis is, to a very large extent, dependent on the degree of relaxation of the tissues that are being approximated. The commonest reasons for failure of any plastic repair are tension and infection in the suture line.

LATE REPAIR OF INJURIES TO THE BILE DUCTS

Secondary repair of injuries to the bile ducts is one of the most formidable operations in abdominal surgery. The patient's presenting symptoms and signs are recurrent attacks of pain, jaundice and fever, or, in other cases, persistent or intermittent discharge of bile through the previous operative incision. The

first operative record will frequently show that the surgeon has encountered troublesome bleeding or marked pericholecystic inflammatory involvement, or he may state that the operation was an unusually easy one, and that he is at a loss to understand the reason for the development of a stricture. The pre-operative diagnosis rests between common duct stone, carcinoma, or stricture due to injury or to pancreatitis. The longer the condition is allowed to persist, the more debilitated the patient becomes and the more irreversible are the changes which develop as a result of the chronic obstruction and infection. All the measures that may be used to enhance the patient's chances of recovery become less effective. The associated anaemia, protein deficiency and hepatic insufficiency, become more difficult to combat. The administration of glucose and thiamine chloride fails to increase the storage of glycogen in the liver to a satisfactory level. Finally, it becomes useless to attempt any surgical interference, or at the best it becomes a desperate chance. It is, therefore, important to recognize, as early as possible, the fact that the common duct has been injured or is obstructed by a stone or other cause, and to urge secondary operation.

Of the several methods available for the correction of stricture of the common bile duct, one must be chosen which meets the individual problem. This depends on the site and extent of the obstruction. A localized stricture, involving the mid-portion of the duct, may have resulted from trauma at cholecystectomy. On the other hand, infection superimposed upon the trauma may lead to extensive cicatrization and a long stricture extending as high as the junction of the hepatic duct or even beyond. In addition, the cicatrizing process may descend the duct to obliterate its distal portion within the head of the pancreas. Involvement of the common duct may occur also apart from injury. It has been suggested by Roscoe Graham that a collection of blood and bile in which some infection may be present, may fail to drain from Morrison's pouch and involve the exposed duct in an inflammatory process which results in extensive scarring. Routine drainage should eliminate this possibility from the great majority of cases.

Reference should also be made to the part which pancreatitis may play. Here the local disease can involve that portion of the common

duct which transverses the head of the pancreas, and it is possible in some cases, at any rate, where a lengthy stricture is found, that the ascending obliterative cholangitis has originated in the pancreas. Indeed, an obliterative cholangitis is found occasionally where no cholecystectomy has been performed and the possibility of its occurrence, apart from surgical trauma, should not be forgotten. Reflux of pancreatic juice activated by bile may be another means whereby inflammation of the duct and subsequent stenosis are brought about.

Several methods are available for the circumvention of postoperative duct obstruction. These methods fall, generally, into two main groups:

(a) *Direct*.—Restoration of the continuity of the biliary tract by means of end to end anastomosis. Theoretically, this is the method of choice, for it secures a natural system of biliary drainage with an intact sphincter at the duodenum. It is questionable whether any advantage results from the presence of the sphincter of Oddi, either in regulating bile flow or in preventing the reflux of duodenal contents after *cholecystectomy*. While the work of Butsch,² Colp³ and others in measuring the hydrostatic pressures required to force open the sphincter in patients with a T-tube indicates that the sphincter continues to function after cholecystectomy, that of Puestow⁴ contrarily indicates that the sphincter after cholecystectomy remains patent, allowing a continuous rather than an intermittent flow of bile. One may wonder if these experiments of Puestow, done on dogs, do not in fact indicate what happens in clinical practice. As the human being produces about 30 ounces of bile daily, it would seem evident that a continuously high intraductal pressure leading to liver dysfunction and probably to pain would result if the sphincter were not relaxed most, if not all, of the time. If it is so that the sphincter remains relaxed, its continued presence in restoration of bile duct continuity is perhaps of small consequence. In my personal experience with spontaneous choledcho-duodenal fistulae, no ill effects have been noted as long as a free opening between the duct and the bowel was present. The chief disadvantage of the direct method is that it is impossible unless sufficient duct tissue on either side of the stricture is present to permit anastomosis. It requires experience in the isolation and mobilization of the trans-pancreatic portion of the common bile

duct. Moreover, I would counsel caution in undertaking extensive and difficult dissection to bridge a wide gap mainly for the sake of recovering the sphincter action.

Whatever method of repair is to be adopted, the first step in the operative procedure is to isolate the proximal portion of the duct. When a portion of it is still extrahepatic, it can be recognized as a distended cystic structure, identification being facilitated by an aspirating needle, when bile or clear fluid may be obtained. A dissection of the tissues distally should next be undertaken to discover what remains of the distal segment of the duct. Frequently, this portion can be detected without too much delay and is found to be in good condition. In other cases, the distal segment will be found to have retracted to such an extent that it cannot be recognized and isolated until the first and second portions of the duodenum have been mobilized and turned over to permit examination and exploration of the posterior aspect of the head of the pancreas. This mobilization of the duodenum and pancreas has the further advantage of producing such relaxation of the tissues that approximation of otherwise fairly widely separated segments of the ducts can be effected without tension and without seriously imperilling their blood supply. In the closure, mucosa is brought to mucosa and non-absorbable suture material on a fine atraumatic needle should be employed. The anastomosis to be accurate and function well, should be performed over a tube.

In the past, the repair has been effected over one arm of a T-tube or using a portion of rubber catheter. As mentioned previously, the tube should be inserted distal or proximal to the line of suture and never through the site of repair. If the anastomosis is made over rubber tubing, extending into the duodenum, it is likely that it will remain in position temporarily only, no matter what agent is used to anchor it, as its presence provokes the usual reaction to a foreign body. Should it remain in place for a long time, the danger of incrustation and occlusion is present and obstruction of the biliary tract may follow. The vitallium tube, introduced by Pearse⁵ in 1941, possesses the advantage over rubber tubing of being less irritant to the tissues, but it also is liable to become blocked if retained for any length of time. Polythene,⁶ a polymer of paraffin, is now available in tubing for various surgical

purposes. As it is chemically and biologically inert, non-wettable and does not precipitate bile salts, it is the most suitable material at present available for bridging the anastomosis in bile duct repairs. However, the chief value of any tube across the suture lines lies in *maintaining patency of the duct during the early phases of healing* when inflammatory reaction and œdema are likely to occlude it. Should any such occlusion occur before healing is secured, intraduct pressure would rise, leading to leakage and possibly to breakdown of the anastomosis, with re-establishment of the fistula. It is thus, perhaps, of little moment what type of tubing is used, *provided it does not fit too tightly, has a lumen which does not easily become occluded, and provided it can be removed or passed relatively easily.*

Desirable though restoration of the ducts in continuity may be, their dissection and exposure must not be continued beyond a reasonable point, for in certain cases the quest may be hopeless or the gap be so wide that any attempt to bridge it by direct anastomosis would end in failure. In such an event, an indirect method of establishing internal biliary drainage will have to be carried out.

(b) *The indirect method.*—This method, whereby the proximal and dilated portion of the duct is isolated and anastomosed to a portion of the gastro-intestinal tract, has the advantage of relative simplicity. It is the only method possible when the trans-pancreatic portion of the duct has been rendered unavailable because of disease or injury, or by the effects of some coincident lesion such as a penetrating posterior wall duodenal ulcer or previous attempts to isolate the duct.

Under certain circumstances, a satisfactory means of restoring the continuity of the biliary tract to the intestine is by choledochoduodenostomy. This procedure is relatively easy. Freeing of the lateral attachments of the second portion of the duodenum permits relaxation for the anastomosis. A transverse incision is made in the anterior wall of the dilated portion of the duct so that its posterior attachments are not disturbed and it does not tend to retract. The closure between the duct and duodenum is completed over tubing which extends into the duodenum and is eventually passed through the bowel. My experience with this method has been satisfactory. If the anastomosis is adequate, the functional results

are good. Two cases with evidence of recurrent cholangitis responded well to sulfonamides.

Often, however, the duct is so short that the distance between it and the duodenum is too great to be bridged. Often, indeed, no evidence of the common duct can be discerned. In such a situation as this, a careful and usually prolonged exploration of the hilum of the liver is indicated. Tissues must be sifted by careful and cautious dissection and structures identified by aspiration with a hypodermic needle. The proximal duct may be non-existent, as is illustrated by the following case:

Mrs. F.C., aged 53 years, housewife, and the mother of 17 children, had undergone cholecystectomy elsewhere in June, 1946, for repeated attacks of colicky upper abdominal pain not associated with jaundice. There was drainage of bile immediately after operation but the fistula subsequently healed. She presented on August 15, 1946, with deep jaundice, hæmaturia and loss of 20 pounds weight since operation. Examination revealed nothing significant other than an enlarged tender liver and marked hypertension (235/120). The icterus index was 74; erythrocytes 3,670,000; leucocytes 6,200; hæmoglobin 72%; sedimentation rate 100 mm. per hour; prothrombin time 15 seconds (50% of normal).

After the usual preoperative preparation of high protein and carbohydrate intake, vitamin K therapy (with clearance of the hæmaturia) etc., she was submitted to operation on August 21, 1946 (anæsthesia: cyclopropane and curare). It was seen that the common duct had been completely destroyed up to the hilum of the liver, at which site there was no dilated sac but only dense fibrous tissue. A long aspirating needle was inserted through this mass of scar tissue into the liver to a depth of fully half an inch before white bile was encountered. A narrow bladed bistoury was then passed along the needle (carefully kept *in situ*) to enlarge the tract, after which a vitallium tube was inserted and fixed with a silk suture. A suitable loop of jejunum was brought up through the mesocolon to the right of the middle colic artery and a small opening made at the apex of the loop for the insertion of the distal end of the vitallium tube. The small bowel was fastened to the under surface of the liver by interrupted silk sutures, taking advantage of the dense fibrous tissue at the hilum. A lateral anastomosis between the two loops of jejunum, below the transverse mesocolon, completed the operation.

Convalescence was uneventful. Her temperature reached 100° for the first three days and then settled to normal. The highest pulse recorded was 100, settling to 86 on the third day. The jaundice gradually improved and she was discharged from hospital on September 11, 1946, with an icterus index of 26. Recheck at the Winnipeg Clinic in October, 1946, showed an icterus index of 7. Since that time, she has been completely free from symptoms. Postoperative radiography showed the vitallium tube still in place in September, but by October it had disappeared.

In all such instances, where the common duct has been destroyed, any procedure other than a hepato-jejunostomy or hepatocholejo-jejunostomy is hardly feasible. In this manner, bile drainage to the intestine is provided either through anastomosis between the hilum and a loop of jejunum or a single bowel segment of jejunum as recommended by A. W. Allen⁷ as well as by Warren Cole.⁸ When a

loop of jejunum is employed, sufficient must be available to permit an entero-anastomosis between the proximal and distal loops at a distance of approximately 18 to 24 inches from the hepato-jejunostomy to divert the small bowel contents from the site of anastomosis, and thus reduce the danger of cholangitis. The anastomosis between the hilum and the bowel is performed over a tube, which may be of vitallium, rubber or polythene. In most of these cases the tube will come away even though fitted with a flange to hold it in place and, indeed, in a well constructed anastomosis, no purpose is served by its remaining permanently.

Where it is decided that hepato-enterostomy is to be performed, using a single loop of jejunum, the bowel is divided at a distance from the ligament of Treitz which will permit its distal cut end to reach the hilum. To this end, it may be necessary to pass the jejunum upward through the mesentery of the transverse colon, in which case the rent in the mesentery must be closed in the usual manner to prevent herniation of other portions of the small bowel. After this decision is reached, *the open end itself of the distal portion of jejunum is approximated to the hilum* over a tube with interrupted fine silk sutures thus bringing intestinal mucosa into the direct apposition with the duct. Around this are placed retention sutures, passed from the serosa of the gut to the fibrous tissue around the hilum, to maintain the security of the anastomosis. I prefer this method of anastomosis under these truly difficult circumstances, for I believe that by so doing I circumvent the danger of further scar tissue formation and obstruction at the anastomosis, the most potent factor in the production of recurrent cholangitis.

Following these steps, the proximal portion of the jejunum is anastomosed, in the manner of the Roux en-Y principle, to the distal part, at least 24 inches from the hepato-enterostomy. In this way, the possibility of small bowel contents or infected material reaching the bile ducts also is minimized.

In all types of repair, the possibility of bile leakage and peritonitis must always be borne in mind, and external drainage provided.

In conclusion, may I state that, from our point of view as surgeons, efforts must be made to persuade the physician that increased safety

in gall bladder disease lies in earlier surgical treatment. Patients should not be allowed to continue having repeated attacks of biliary colic. The surgeon must improve his technique in the performance of operations on the gall bladder and bile ducts, develop team work in his operating room, and employ fully the newer as well as the proved and established pre-operative and postoperative procedures. He must also be prepared to accept the dictum that patient, complete isolation and visualization of the anatomical structures concerned are the essence of any operation on the extra-biliary apparatus. Should injury to the bile ducts occur in spite of the utmost precaution, such injury should be recognized and repaired immediately or, if immediate repair is not possible, provision should be made for repair in the *early* postoperative period.

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NEUROPSYCHIATRY AND MEDICINE*

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IT was only recently that the Dean of a Canadian medical school told of an incident which portrays the schism now present between psychiatry and the other branches of medicine. The Dean had arranged a discussion between two medical groups, allergists and psychiatrists, on the problem of urticaria. The psychiatrists arose first and in their discussion mentioned matters of early psychological development, conflict, frustration, and so forth, ending with the view that about three-quarters of the cases of urticaria are of psychiatric origin. The allergists then arose to discuss shock organs, histamine, desensitization, etc. But when the discussion was over neither group understood the concepts of the other,

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and as a result was not in the least interested in incorporating such concepts into its own framework of knowledge.

It has been our opinion for some time that one of the greatest defects in most psychiatric programs lies in the split between this field and the field of medicine. As 50% of patients who go first to their doctor have essentially an emotional origin for their complaints, it would seem that one of the most important answers, prophylactic as well as therapeutic, lies in the integration of psychiatric principles and practice into general medical practice. Not only does the patient get earlier treatment thus, but, in our opinion, here is offered one of the greatest avenues to mental hygiene that can possibly develop. The general practitioner has always been the healer. If he could be won to incorporate mental hygiene principles into his physic, then a great step would have been taken in the right direction. Some say that this cannot be done, that medicine is lethargic towards the psychological and that, therefore, other groups have had to be trained for various aspects of work in this field. I believe these people err in their judgment. Rather than the general practitioner being at fault, it would seem more likely that the psychiatrist living in his ivory tower has been too remote from the other branches of medicine and that the integration of psychiatry with the rest of medicine has lagged far behind. With psychiatric language so cumbersome, so obtuse, so "schoolish", it is reasonable to think that it is largely because of the lack of understanding that the general physician has not been able to incorporate psychological principles into his field of general practice.

Only by the incorporation of the psychiatrist in the general hospital of today can the hoped-for advances in this process take place. Until this integration has occurred, medicine in general will lack the valuable aids that psychiatry can give, and psychiatry will lack the balance which medicine can give it, to see the patient as a whole, with the psyche interacting with the soma.

By this extensive integration of psychiatry with medicine, not only will both profit practically in therapy and prevention, but probably there will develop much greater advances in the field of research; advances such as are suggested by Caspersson's recent work in Sweden

in connection with the effects of malononitrile on the nucleoprotein metabolism of brain in the constitutional depressions and schizophrenia. Here a union has occurred between neurophysiology, biochemistry and psychiatry, which may do amazing things in the future.

In the past 18 months it has been my privilege to attempt some "psycho-somatic" integration in the essentially non-teaching centre of Regina, a city of some 65,000, equipped with two general hospitals and with a bed capacity of about 900 (soon to expand to about 1,600). To my great surprise some physicians in this city were already eager for such an approach to many of the problems involved in the sick person.

In this paper I should like to point out a few of the details of progress: (a) in treatment under the Department of Veterans' Affairs; and (b) in private practice.

In the division of medicine in the Department of Veterans' Affairs in Regina there is a rather unique set-up. In this, neuropsychiatry is now actively integrated with medicine. It has become one and the same department. Internist and neuropsychiatrist work together in treatment of patients in hospital and patients out of hospital, in patients on a medical service and in patients on other services.

In ward rounds, the neuropsychiatrist is present to assess psychosomatic aspects of all medical problems, to assist in the diagnosis or treatment of neurological problems and to treat the psychological problems. All these patients are treated on the regular medical wards. Because the patient has a psychoneurosis which has required hospitalization, it is not considered that he should be segregated in a mental ward and treated as a mental patient. He has a medical disability just the same as the patient with pneumonia. Although it takes time to break down the barriers which formerly segregated these two types of patients into separate wings of a hospital or separate hospitals, we feel it is easier to break down these barriers than to break down the stigmata attached to being in a mental hospital.

In the out-patient department also, the neuropsychiatrist integrates his services with those of general medicine. The one out-patient department in the hospital serves again both internist and psychiatrist. There, in addition

to neurological and psychiatric referrals which he sees commonly, the neuropsychiatrist may at any time be asked for opinion as to the psychological factors in any organic illness. Consequently, patients that come to our out-patient clinic every afternoon are sent in the same way to see a psychiatrist as they are to see the internist. They may see the two, both in the same afternoon, and only a single report may sometimes be written to incorporate the investigations. For in the diagnosis and treatment of the psychosomatic problem, it seems to us that a setting where both aspects can be viewed is the only practical one. Only here does the physician get a chance to see the effects of a psychological conflict on physical function; only here does the psychiatrist get a chance to develop his clinical acumen to the point that he can appraise the functional and organic factors together.

Such a combined attack on the problem of disease and dysfunction has many advantages. We who work with it can only sing its praises. In the first place it gives a fast service free of inter-departmental time-wasting. Secondly, it treats psychiatric maladjustments as medical problems. Hence, it is face-saving for such patients. Third, it gets closer to the answer in psychosomatic problems than can any other system. Fourthly, it nourishes in the internist the psychological viewpoint, thus making him a better physician. Fifth, it keeps the psychiatrist's perspective on the general hospital plane, thus making him a better physician also. Sixth, the greatest advantage of all is that accruing to the taxpayer; for early and accurate diagnosis of the many psychosomatic difficulties has cut down the inevitable and expensive cost of hospitalization which is required for diagnosis through exclusion. We believe that by working together, psychiatrists and internists, we are in a much stronger position to make a diagnosis of a functional disability positively in a short time than either working alone. Most of us know that the long and arduous diagnosis by exclusion which so frequently occurs, requires hospitalization with senseless use of funds for extensive clinical and laboratory investigation.

Our aim has been to attempt control of admissions to the medical in-patient service through our out-patient clinic. In 1947, there were 2,018 cases seen in medical out-patient clinic of the Department of Veterans' Affairs in Regina. Of

these, a total of 844 cases were psychosomatic mixtures or psychoneuroses, the great majority of which could be effectively handled in the out-patient department. In short, 42% of our volume of cases belonged in this functional category. In our medical in-patient service in 1947 we had 753 patients during the year. Only a total of 90 patients or 12% of the patient volume were discharged with a functional diagnosis. Of this group of 90, 64 were psychoneuroses and 26 were psychosomatic problems.

During 1948 the ratios are similar, although now our incidence of psychological problems in the out-patient department has fallen to some extent and more stubborn psychological problems were admitted to hospital for closer investigation and treatment.

Therapy for the functional problem in such a combined department of medicine and neuropsychiatry has been widely varied, depending on need. In a good many instances complete and thorough medical history and examination, including an adequate personal history, followed by a simple explanation on a functional basis, are all that is required. It is fascinating to work with internists who have acquired a psychological point of view and are thus constantly on the alert both in their investigation and in their therapy to this end.

As an example, in the past, every Thursday afternoon has been known as Cardiac Clinic. On this day all patients seen are referred because of cardiac symptoms. Many turn out to have what we now term a cardiac neurosis which has been previously termed D.A.H., effort syndrome, neurocirculatory asthenia. Common symptoms in this type of patient are general weakness with mild exertion, great palpitation on exertion, left mammary pain not directly related to exercise, occasional attacks of nocturnal dyspnoea, combined with non-significant cardiac findings. Following World War I, the syndrome frequently appeared after a heavy shelling or the patient's being buried alive. It is frequently seen in patients following World War II after an attack of rheumatic fever, sometimes typical and sometimes atypical, but during which considerable concern has been displayed by the doctor in reference to the patient's heart, and during which illness the patient has been confined to bed for some period of time. Although one may be suspicious in these cases, a complete history is continued, a complete ex-

amination is carried out, the patient is cardio-scoped and may have an electrocardiogram. During the cardioscopy and the electrocardiogram procedures, great care is taken not to make any remarks which could be misinterpreted by the patient. If the heart appears normal on the screen, comment is made to this effect. If the electrocardiogram appears normal, then some remark is made as to its normalcy following the taking of the cardiogram. At the end of this investigation the patient is told of the intact nature of his cardiovascular system and usually after such a program of investigation he believes it. Following this, a talk is given to him in regard to the effect of emotions on the cardiovascular system and the commonness of his symptoms is illustrated to him by various methods. A good many patients are so relieved at definitely hearing that their heart is normal, for the first time, that they are willing to accept any further explanation. Repeat visits are scheduled to the clinic for the patient, and his problems are discussed further and he is re-examined again as necessary. The patient is made to feel that his doctor is there to help him and not to cut off his pension. It is, of course, impossible where a patient has had symptoms of a cardiac neurosis for twenty-five years to do anything about them, especially if he receives a pension for D.A.H. But the case who can benefit from such treatment, as is noted above, is the young adult whose work tolerance and whose enjoyment of life is being severely handicapped and yet who has not had time to have cardiac neurosis become sufficiently ingrained to make him a "cardiac invalid". This is the type of case which can benefit by time and explanation under the above circumstances, and in a setting which is both medical and psychological.

As in the case of the cardiac neurosis, unfortunately, a good many psychosomatic syndromes are iatrogenically induced in the same way that the parent induces a neurosis in his child by his own fears. Many of the dyspepsias, post-traumatic cerebral syndrome following a minor head injury, some hypertension, etc., are syndromes in which medical emphasis actually makes the syndrome. In treating most of these syndromes we follow the same principles as illustrated in the case of cardiac neurosis. In short, we combine medical investigation with positive therapy in an all-out

attack. We include physiotherapy, occupational and recreational therapy and psychotherapy in such an attack as it becomes necessary.

Where, as in many of these cases, there is subconscious blocking, further and deeper analysis with amytal or pentothal, if necessary, is done. Where there is considerable free floating anxiety, programs of subshock insulin are used. All psychological and psychosomatic problems get daily physiotherapy and occupational therapy. In the near future we hope to have available occupational therapy for all patients. We have even occasionally used electroshock therapy on D.V.A. patients on this service.

Private practice.—In private practice we have employed the same principles as those which we have found so effective in the Department of Veterans' Affairs. We are linked in a system of group practice which includes all essential specialties. Here again neuropsychiatry is incorporated with internal medicine. Our letterhead: "Section of Internal Medicine and Neuropsychiatry" symbolizes the union which has taken place. Again, we who work in such a setting find the advantages legion. In the same building we have the facilities for investigation of most organic and psychological disturbances. Many psychiatric disorders, practically all so-called psychomatic disorders, can be handled in such a setting. Again, it is often possible to avoid hospitalization. In a few short months other branches have become acutely aware of the possibility of psychological disorder. Referrals can be swiftly made without loss of time. Informal consultations with orthopaedics, gynaecology, radiology and surgery (not to mention the constant interchange with medicine) not only bring these groups into the psychological orbit, but encourage the neuropsychiatrist to think in terms of a person as a whole.

It is interesting to note in a rough compilation of figures how time-savingly effective such a system can be where a patient requires neuropsychiatric treatment as well as treatment by other departments. In a group of 160 new patients seen in the months, January to May, 1948, by neuropsychiatry, 69, or approximately 43% were, during the same time, under necessary investigation and/or treatment for other conditions. In the majority of these it was my im-

pression that deprivation on either side would have prejudiced and prolonged the patient's recovery unduly. Where the psychiatrist practises alone, or where the neuropsychiatric patient is treated essentially apart from other patients, these unfavourable features of concentrating on the mental aspect, to the exclusion of the physical, are far more likely to occur.

We have found in such a type of practice, with neuropsychiatry integrated with medicine, the stigma which going to a psychiatrist has for many patients, is broken down. The psychiatrist becomes another doctor. In such a clinic setting it has been possible to utilize a wide range of therapy; investigative therapy, physiotherapy, electroconvulsive therapy, psychotherapy.

In the matter of electro-shock therapy, may I make a few remarks?

Electro-shock therapy.—In the last year, for the first time in Regina, electroconvulsive therapy was started outside a mental hospital setup. During the year following its inception treatment was given in the physiotherapy department of the General Hospital. During the past few months our own private clinic facilities have been used additionally. We consider such facilities effective for early and mild psychoses, with the patient hospitalized in a general hospital or nursing home or not hospitalized at all.

With clinic type facilities great speed in investigation is possible. For instance, suppose a 65-year old patient arrived at the clinic one morning with an involutional depression, as well as a history of an old fracture of spine, and also a history of substernal distress. During that day the patient can have a physical examination, laboratory investigations, electrocardiogram, x-ray of spine, and if not contraindicated, can be getting shock the next morning as an out-patient, his physical disabilities having been properly assessed and his risk properly known.

In fifteen months we have given electro-shock therapy to just under 100 patients. Of these, over 50% were either out-patients or were in hospital mainly for accommodation purposes. Most of these patients were referred early in their illnesses by their family doctor. In this group the complications have been as follows:

1. There has been one death (from anuria, to be reported later).
2. One suicide (two months following treatment after a known marked improvement).
3. Only two patients, to my knowledge, have had to be transferred to a mental hospital during or following treatment to date.

4. Only four patients had to be transferred to a psychopathic ward during or after treatment; each of these latter recovered sufficiently to go home within the three weeks. These four had been in hospital during treatment.

Of this group the two largest classifications were depressions and schizophrenic reactions, 29 of the former and 21 of the later. Together they make up over 50% of the total.

Thirteen of the hospital group receiving electro-shock therapy were under treatment for some physical disorder at the same time as electro-shock was being carried out. They were kept in their original wards and except for actual treatments their original treatment was carried out as usual. For instance, one 65-year old man developed a depression following an abdomino-perineal resection of a carcinoma of the rectum. Another 56-year old woman developed a manic attack between the first and second stages of the resection of her ascending colon. Both of these patients recovered and went home well without their postoperative routine being affected in more than a minor way.

It is my belief that in the extension of such a program as this lie many of the answers to early treatment and prevention in psychological disorders. For in this way do other specialists integrate some psychiatric concepts with their own and thus their "index of suspicion" is raised early on. Likewise, once the seeds are sown other branches get the concept of prevention through education of the patient and if the patient is a child, through education of the parent.

Surely if we believe in the extension of psychiatric principles beyond the psychiatrist, there is no reason why this should be denied to all the other branches of medicine. At present they are being spread to non-medical groups. The doctor of medicine has always been considered the healer in every sense, and when other groups have been allowed to supplant him, then mistakes have occurred and quackery has flourished. In my opinion, other branches of medicine are hungry for psychiatric help at the bedside, in the consultation room and in the home. And through his close contact with the physician, the psychiatrist becomes a better doctor.

In my opinion medicine needs psychiatry; psychiatry needs medicine!

Medical Arts Clinic.

EXPERIENCE WITH LEUCOTOMY AT THE PROVINCIAL MENTAL HOSPITAL, BRITISH COLUMBIA*

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FEW psychiatrists would now maintain that the operation of pre-frontal leucotomy is an unjustified assault on the human brain. Neither would the most enthusiastic proponent of leucotomy claim that the operation is an ideal therapeutic procedure. Surgery as a cure, or as part of the cure, of mental disease, is going through an exploratory phase. Many aspects of the subject have yet to be clearly defined. The operative technique, far from standardized, will probably undergo further development. The most suitable cases for operation, the stage in the development of mental disease when operation should be employed, and the relation of operation to other forms of therapy, all deserve further study.

Treatment of selected cases of pre-frontal leucotomy was commenced at the British Columbia Provincial Mental Hospital in August, 1945. This report is based on a survey of the first hundred consecutive cases. Sixty-five of these patients have been closely followed for one to three years, the remaining thirty-five from four months to one year.

SELECTION OF CASES

A decision to perform leucotomy requires thoughtful consideration. The physical risks of operation are not great, but one cannot lightly undertake a procedure which causes an irreversible alteration of the personality. The effects vary in different patients. Some are rendered dull emotionally, lacking in initiative and constricted in interests. Others are euphoric, lacking in tact and judgment. These changes of personality do not always seriously interfere with the patient's regular activities. In the most favourable cases, the relatives may detect little change from the prepsychotic personality. There may be only a somewhat diminished ability to concentrate and a tendency to procrastinate.

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One must balance the unfavourable changes which may result, against the relief in symptoms which may reasonably be expected. The following symptoms are favourable indications for operation: sudden onset of the psychosis, the occurrence of psychotic symptoms in a series of acute episodes, the presence of psychotic symptoms accompanied by a marked emotional response, and evidence of a fair degree of preservation of the normal personality characteristics.¹ Symptoms such as nervous tension, anxiety, depression, excitement, resistiveness, stupor, destructiveness and combativeness, are relieved in a large percentage of instances. On the other hand, those symptoms indicating a lack of emotional response, such as docility, vagueness, true apathy and emotional flattening are definite contraindications. Delusions, hallucinations and obsessions may become improved inasmuch as they come to play a less prominent part in the life of the individual.

The prognosis following leucotomy is largely dependent on the stability and integration of the premorbid personality. If the patient has been ambitious and has displayed good initiative, and if his work adjustment has been satisfactory, the prognosis is more favourable. If, on the other hand, he was a shiftless ne'er-do-well, prior to the onset of his illness, little improvement can be expected. When such premorbid characteristics as rigidity, egocentricity, self-consciousness and concern for the future are noted to an exaggerated degree and when these same characteristics play a part in the psychotic symptoms, the outlook is better.

When discharge from mental hospital following operation is hoped for, one needs to evaluate the resources for rehabilitation in the patient's home. The changes in personality which follow operation may make it difficult for a patient to carry on a normal existence outside hospital without help and supervision. When the environmental situation is unfavourable, leucotomy is of questionable value, unless our object in operation is the improvement of their hospital adjustment. For this reason it seems unwise to allow a patient to remain in mental hospital too long prior to operation. A prolonged stay of many years leaves the patient with tremendous psychological and sociological problems at the time of discharge. Homes are disrupted and families broken up.

Those very assets essential for successful rehabilitation are no longer available.

There are approximately 3,200 adult patients in our institution. The doctors of the attending staff periodically submit suggestions regarding suitable cases for leucotomy. These cases are reviewed by a special Leucotomy Board comprised of three of the senior staff and the attending psychiatrist. The relatives of selected patients are informed, and special consent obtained. An average of one operation per week is performed. The patient is transferred by ambulance from the Provincial Mental Hospital at Essondale to the Vancouver General Hospital, a distance of sixteen miles. The same ambulance returns the patient who has undergone operation the previous week.

NEUROSURGICAL ASPECTS

A uniform operating technique was employed for each of the one hundred cases, by one operator. This technique has been previously described.²

Briefly, trephine openings are made over the prefrontal area on both sides at measured points which lie 4 cm. lateral to the midline and 11 cm. posterior to the junction of the nasal and frontal bones. Employing special measures to ensure accurate and continuous orientation, the white matter of the frontal lobes is transected through these trephine openings by a specially curved, blunt dissector. The line of transections is a coronal plane which is aimed to remain 0.5 to 1 cm. inside the margin of the cortex and which passes through the anterior tips of the lateral ventricles.

Postoperative complications have seldom been encountered. There were two cases of wound infection which appeared to start as a cellulitis of the scalp. We attributed one of these infections to a violent scratching of his wound by the patient on the first postoperative day. After this experience we applied arm restraints, which are never resented by these patients, for the first four postoperative days. The second infection appeared to result from a boggiess of the scalp induced by covering the dressing by an air-tight adhesive which was not removed for several days. Since this experience we have applied light dressings and removed the superficial stitches on the first postoperative day. Both of these patients developed brain abscess in the depths of their leucotomy incision. They recovered from the abscess and likewise made a good recovery from their psychiatric disability. Both of them subsequently suffered a few major convulsions which were controlled by anti-convulsant medical therapy. One other patient

suffered a major convulsion one year after operation, making an incidence of epilepsy in the total group, of 3%. Time may reveal a few more cases of epilepsy in our group but the incidence to date is low, and is readily explained in two of the three cases.

There was one postoperative death in the group. This patient would not have been chosen for operation if we had correctly interpreted certain preoperative medical aspects of the case. He was a young man, a schizophrenic, who had previously suffered from an obscure anaemia, and whose mother had died from Banti's disease. He likewise suffered from Banti's disease, a circumstance which was not revealed until post-mortem. A "bleeding" tendency was evident at operation but its true significance not appreciated. He bled into the transection areas so that blood approximating a mass the size of a hen's egg accumulated on both sides.

REHABILITATION

The environment to which the patient returns following operation, has a definite influence on the final outcome. Following the initial postoperative week our cases are transferred to the infirmary ward of the mental hospital for an average stay of two weeks. They remain there until their incisions are well healed and until vomiting and bowel incontinence are under control. They are encouraged to take an interest in their personal appearance and an attempt is made to interest them in simple tasks.

For the later postoperative phase of two to six months, they are moved to a special ward which can accommodate twenty-four patients. An active program of rehabilitation appears to be of importance during this stage. Four nurses are assigned to the ward, and it has been arranged that this staff remains more or less constant. In addition, use is made of the various auxiliary services such as occupational therapy, recreational therapy, and social service. Our aim is to re-educate the patient to live and act in a more acceptable manner. The operation usually makes the patients easier to work with and more malleable. They respond well to individual care by a tactful and understanding staff. The majority of patients are lacking in initiative and drive following operation. If left alone they would just sit around. Some of them can be prodded a great deal, others if prodded too much, show irritability and impulsive be-

haviour. Each individual needs to be carefully observed to determine just how much stimulation and encouragement can profitably be applied. They are started on comparatively simple tasks and, as improvement is noted, the complexity of the tasks is increased. As soon as possible they are encouraged to get outside in groups and to take part in various forms of group activities. We have found that gardening is a very useful form of activity to re-awaken normal interests during this period.

The relatives are encouraged to take an active interest in rehabilitation of the patient. By a graduated program of ward visits, drives, and then visits at home, an attempt is made to make the transition from hospital to home life smooth and gradual. We favour a relatively early discharge, especially where the home environment is suitable.

Various forms of physical treatment have a place in after-treatment of some of the post-leucotomy patients. We have used both somnolent insulin and electric convulsive therapy quite extensively. These treatments are usually postponed until at least one month following operation. Electric convulsive therapy is used in controlling excited states and somnolent insulin in cases where restlessness, insomnia and tension are troublesome symptoms.

RESULTS

Of the 100 patients treated by operation, 32 appear to have been markedly benefited. Several of these were patients who had been confined to the Mental Hospital for five to ten years. Another 50 patients are recorded as having shown varying degrees of improvement in their symptomatology. (Some of these will eventually be discharged to suitable environment). Seventeen have obtained no improvement whatsoever. Of the 100 patients, a total of 31 have been discharged from hospital since operation, and remained out.

The schizophrenic reaction type constitutes the large bulk of our total group (79 cases). Of these, 43 were labelled paranoid schizophrenia, 26 were catatonic schizophrenia, three hebephrenia, and four mixed type of schizophrenia. Of the group of 79 patients, 19 have been classed as much improved, 45 improved, and the remaining 14 no improvement. Twenty-one of this group of schizophrenic patients have been discharged from hospital since operation.

Many of these patients were chronic cases of year's standing and had been considered hopeless in their prognosis. All other modes of treatment had been of no avail in practically all of these cases. It would appear that without operation they would have continued to present their disturbing symptoms for many years.

In this group of schizophrenic patients, individual cases were chosen for operation for one of two reasons. One group was composed of those who were chronically disturbed and who had been presenting very serious and disagreeable nursing problems for years. They went to operation with the hope that the disturbing symptoms could be relieved and thus make possible a better adjustment to hospital routine. The second group presented a better outlook, where we were hopeful for a relief of symptoms making possible rehabilitation back to their homes.

Forty-one of the schizophrenic patients were selected for operation only with the thought in mind of improved hospital adjustment. These were not individuals for whom much hope was held for rehabilitation outside hospital. Factors which appeared to limit possibilities for discharge included the chronicity of the illness, personality deterioration, and poor family resources.

Of the forty-one patients in this group, two are recorded as much improved, 30 improved and 9 unimproved. Five have been discharged. Two of these patients were much improved and the other three showed sufficient improvement that interested families were able to make satisfactory plans for these patients under supervision at home.

It is interesting to note that of these 41 patients, 37 had exhibited chronically aggressive and violent behaviour which made it necessary for them to be secluded for considerable periods of time over the last several years. Of these only eight have had to return to seclusion at any time since operation. Four have been discharged and the other 23 have been able to adjust satisfactorily toward life without presenting any problem necessitating seclusion.

The remaining 38 schizophrenic patients were all considered as reasonably good prospects for obtaining definite relief of symptoms leading eventually to discharge from hospital. The majority of these patients had been in

hospital for shorter periods of time, most of them under four years, although a few in this group had been patients in hospital for a period of seven to eight years. All of these patients had presented disturbing symptoms indicating evidence of emotional tension. All had received a thorough trial with other forms of therapy without success. The results in this particular group were naturally much better. Seventeen obtained marked improvement, another 15 obtained some degree of benefit and the remaining five are classed as unimproved. Of this same group 16 patients have been discharged up to the present time.

If one is looking for 100% recovery in schizophrenic patients, *i.e.*, a complete disappearance of all symptoms, and absence of all personality disturbance, one certainly will be disappointed. Usually the schizophrenic patient has one or more active and disturbing symptoms superimposed on a basic schizoid and unstable personality. At best, we can only hope for relief of the superimposed symptoms. After operation we still have to deal with a schizoid personality with its various vicissitudes and idiosyncrasies. One cannot hope for operation to relieve these basic factors. Better results can be looked for in the catatonic paranoid types than in the simple and hebephrenic.

Our experience with leucotomy in the affective reaction types has not been as extensive. The majority of these psychoses fortunately respond to other less radical forms of therapy, and it is only in the occasional case that surgery needs to be considered.

In our series of 100 cases there were only five with a diagnosis of involutional melancholia. All five had been treated with electric convulsive therapy and had either failed to respond or failed to maintain improvement. Of the five cases operated on, four have been relieved of their symptoms and have been rehabilitated satisfactorily in their homes. These four all had very interested families who were able to provide satisfactory supervision. The remaining case showed some initial improvement but has since retrogressed due to what appears to be definite organic personality changes.

Of the seven manic depressives operated on in our series, definite improvement has been noted in all but one. All of these patients had been subject to episodic attacks for

many years. Since operation there has been a marked levelling off of their emotional responses. No further attacks have occurred in any of these six. However, there has been a very definite loss of drive and initiative in most of these patients which has interfered with any plans for rehabilitation. This has been more noticeable in those patients who have been confined to hospital for longer periods of time. We have only been able to arrange discharge for two of the patients in this group and these were both patients who had been having recurrent attacks for many years, but their last admission to hospital had been comparatively short, a year or so. The remaining patients although not suffering from any manic or depressed attacks, have shown a certain apathy, disinterest and loss of initiative which makes rehabilitation difficult unless some very protected environment could be afforded for them.

The number of psychoneurotics treated by leucotomy has been small, partly due to the fact that the incidence of admissions of psychoneurotics to mental hospital is comparatively low. In our series only five psychoneurotics have been operated on. All five suffered from chronic anxiety states. They had been ill for many years. They had received various forms of therapy, in spite of which their symptoms had become progressively worse. All of these patients have obtained marked benefit as a result of the operation. Three already have been discharged and rehabilitation plans are at present under consideration for the remaining two.

SUMMARY AND CONCLUSIONS

A review has been presented of the results obtained in the first 100 patients treated by leucotomy at the Provincial Mental Hospital in British Columbia. The majority of patients in this series have been schizophrenics. The operation appears to be of definite value in relieving many of the troublesome symptoms in this type of psychosis. Excellent results have been obtained in those psychoneurotics and involutional melancholics who were subjected to operation. The results that can be obtained seem to depend in large part on selection of suitable cases, a careful and thorough operative procedure, and intensive treatment in the postoperative rehabilitation period.

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DICOUMAROL IN ACUTE CORONARY OCCLUSION*

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A STUDY of all cases of acute coronary thrombosis admitted to the medical wards of the Montreal General Hospital between January 1946 and May 1948 has just been concluded. One of the main purposes of this study was to investigate the effect of dicoumarol on the overall mortality and on the thrombo-embolic phenomena associated with this disease. During the first sixteen months of this period, alternate cases were given dicoumarol; the remainder, receiving only supportive therapy, served as controls. During the following thirteen months, all cases were given dicoumarol, as the increasingly favourable reports in the literature on this form of treatment appeared to render the original course unjustifiable.^{1 to 4}

In this manner, a total of 57 cases of acute coronary occlusion with myocardial infarction were studied, 38 being given dicoumarol, and 19 receiving only supportive therapy. In order to increase the control series to a number equal to that of the treated group, an additional 19 cases were picked at random from the 1945 records of this hospital. This brought the total number of cases to 76, half of which received dicoumarol and all of which were given the same supportive therapy.

All cases which died within 48 hours of their initial attack were excluded from both the treated and the control groups, as dicoumarol could not be expected to influence the course of the disease during this period.

Methods employed.—In those cases treated with dicoumarol, the dosage used was that described by Barker and his associates.⁵ A 300 mgm. dose was given orally as soon as the presumptive diagnosis was made. Single doses of 100 to 200 mgm. were then given whenever the prothrombin time was below 35 seconds.

Prothrombin time determinations were carried out using Quick's method.⁶ Thrombo-plastin was prepared weekly from the brain of a freshly killed rabbit. With this thrombo-

plastin, normal values for prothrombin time were 15 to 22 seconds.

Results.—Of the total of 76 cases investigated 19 showed thrombo-embolic complications, including extensions or recurrences of their original coronary occlusion. These are shown in detail in Table I. It will be seen that in

TABLE I.
TOTAL COMPLICATIONS—FATAL AND NON-FATAL

Complications	Controls		Treated	
	Fatal	Non-fatal	Fatal	Non-fatal
Pulmonary infarction	2	1	1	2
Mesenteric infarction	—	—	1	—
Renal infarction	1	—	—	—
Thrombosis of leg veins	—	1	—	—
Arterial embolus (1 radial) ..	—	1	—	—
Cerebral embolus	—	—	—	1
Secondary coronary occlusion or extension	4	2	2	—
Total thrombo-embolism	7	5	4	3
<i>Other complications</i>				
Congestive heart failure	—	—	1	—
Sudden death (post mortem showing only the coron- ary occlusion)	2	—	—	—

the control series, 12 cases (31.6%) had complications, while in the treated group only 7 cases (18.4%) showed such occurrences. Two cases showed more than one thrombo-embolic phenomenon.

A review of the 7 treated cases which developed thrombo-embolic complications or extensions shows that with one exception, all had lapses in their prothrombin times to sub-therapeutic levels within 48 hours prior to the complicating episode. The remaining case was well controlled throughout the course of treatment, prothrombin time never falling below 36 seconds after the 5th day in hospital.

Fatal thrombo-embolic complications or extensions occurred in 7 (18.4%) of the control series, and in 4 (10.5%) of the treated cases. In addition to these, two of the control series died suddenly, but at autopsy revealed no lesion other than the original myocardial infarction, and one of the treated cases died of congestive cardiac failure. The overall mortality was therefore 23.7% in the control series, and 13.2% in the treated cases.

SUMMARY AND CONCLUSIONS

1. A series of 76 cases of acute coronary thrombosis with myocardial infarction has

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been studied, half of the cases being treated with dicoumarol.

2. The incidence of thrombo-embolic phenomena (including extensions of the original lesion) was 18.4% in the treated cases as compared with 31.6% in the control series.

3. Of the 7 treated cases which developed thrombo-embolic phenomena, all but one had lapses in their prothrombin times to sub-therapeutic levels just before the occurrence of the complications.

4. The overall mortality rate in our series was 13.2% in the treated cases as compared with 23.7% in the control group. The mortality rate due directly to thrombo-embolic phenomena was 10.5% in the treated group, and 18.4% of the control series.

The authors wish to express their thanks to Messrs. Ayerst, McKenna and Harrison for assistance in this investigation.

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RÉSUMÉ

Etude d'une série de 76 cas d'infarctus du myocarde, dont la moitié ont été traités par le dicoumarol. Celui-ci a été donné en doses de 100 de 200 milligrammes, de manière à maintenir de temps de prothrombine au-delà de 35 secondes. Dans la présente série, les complications de l'infarctus du myocarde par occlusion coronarienne ont été des embolies pulmonaires, mésentériques, rénales, cérébrales, radiales; la thrombose des veines des membres inférieurs; des occlusions coronariennes secondaires; l'insuffisance cardiaque (un seul cas) et la mort sans autre complication. On le voit, le plus grand nombre de ces complications reconnaissent pour cause la mobilisation du caillot ou son extension. On s'explique ainsi que leur fréquence ait été plus grande dans les cas témoins (31.6%) que chez les malades ayant reçu le dicoumarol (18.4%). Chez ceux-ci, la mortalité est également moindre (13.2% au lieu de 23.7%). Il est intéressant d'observer que les accidents énumérés ci-haut sont presque toujours précédés d'un retour du temps de prothrombine à un niveau sub-thérapeutique.

PAUL DE BELLEFEUILLE

A contributor to the Vienna *Klinische Wochenschrift* notes that flies have been eradicated in the canton of Wallis and the city of Lucerne in Switzerland by DDT spraying for the last two years, with no effect on the prevalence of infantile paralysis. Most authorities consider flies of no significance in the spread of this disease but obviously there are plenty of other reasons for fly eradication.—*Hygeia*, 27: 74, 1949.

REFLEX SYMPATHETIC DYSTROPHY

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FOLLOWING various kinds of trauma, and in some inflammatory states, there is sometimes observed an abnormal vascular reaction, intimately associated with pain. This reaction, originally physiological in character, becomes pathological when the phenomena are exaggerated in degree or prolonged in duration.

This local vascular response is activated through the agency of the autonomic nerves. It results in a disturbed nutrition. That it is reflex in character is now well established by both experimental and therapeutic experience. Therefore the term "reflex sympathetic dystrophy", used by many of the American workers, may aptly describe the various conditions, some of the more familiar of which are listed below.

- Traumatic oedema or vasospasm.
- Sudeck's atrophy, or post-traumatic osteoporosis.
- Causalgia of the true classical type, described by Weir Mitchell.
- Minor causalgia, described by Homans.
- Post-traumatic pain syndromes.
- Thrombophlebitis and post-thrombophlebitic oedema.
- Tender scars or other "trigger areas".
- Muscle spasm, cramps, weakness.
- Coldness and sensitivity to cold environment.
- Discoloration of skin, mostly cyanotic.
- Excessive sweating, trophic changes.
- Hyperalgesia and hyperaesthesia, elevated skin temperature.
- Pain, constant, spreading, with exacerbations, not corresponding to segmental nerve distribution.
- Swelling and oedema.
- Osteoporosis and joint stiffness, ankylosis.
- Mental anxiety, pain related to emotional state.

Dr. Takats¹ assures us that all of these varying states are essentially similar in nature, but that they represent different manifestations of the one fundamental pathological process. So that of the symptoms and signs common to the group as a whole, one or more will dominate the picture according to the kind of injury, its duration and location, and the personality type of the patient.

A brief account of a few of these conditions, in patients who have recently come under our care, will serve to demonstrate some of the important principles pertaining to the recognition and treatment of this syndrome.

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The first represents a case of Sudeck's atrophy, or post-traumatic osteoporosis.

This man, aged 49, happened to be in hospital some months previous to his injury, receiving treatment for an old chronic skin lesion at the back of his left ankle, which healed without significance. But this admission provided us with an x-ray picture of the foot which served as a comparison when he was subsequently admitted. Following his discharge he wrenched his left ankle. It became swollen and very painful, and he was unable to use it. As the weeks went by, the swelling remained, accompanied by considerable pain; the part became exquisitely tender, took on a bluish cyanotic discoloration, and was cold, clammy, and covered with sweat. Four months following this injury he returned to hospital, in great pain, holding the injured foot off the floor, in severe mental distress, and allowing no movement whatsoever. The x-ray films revealed marked osteoporosis.

Paravertebral procain block to the lumbar sympathetic trunk caused some relief in his symptoms, and he was given a lumbar ganglionectomy, with very marked improvement in his condition. Subsequent physiotherapy included the use of whirlpool baths, massage and active movements. Three months following his operation he had approximately 75% of movement in the ankle joint, he was practically free from pain and was walking about with the aid of a stick.

Next are two cases which represent the post-traumatic pain syndrome. The first was most dramatic.

This 43-year-old man had injured the pulp of the terminal part of his left index finger, with a saw in January, 1944. Since the injury he had not been able to use the finger because of pain and stiffness. Two months previous to his hospital admission, three and a half years later, he began to have pain in the wrist, constant and shooting in character, and there was an associated weakness. He could not use knife or fork, and he was unable to continue with his work. On examination the index finger was atrophied; the skin was shiny, smooth, congested, and covered with sweat. There was marked tenderness over the distal part; and ankylosis of the distal joint. Hyperaesthesia to pinprick was noted over the entire finger.

A single procain block to the upper thoracic segment of the sympathetic trunk was followed by marked relief of pain and only slight tenderness. Physiotherapy was continued and he would now allow massage; active movements were started. Ten days later he was discharged to return to work. Six weeks later he reported that he had minor discomfort only in the very tip of the finger, and he was using the finger in many ways. Hyperaesthesia remained in the extreme tip only, the remainder had normal sensation and was warm. There was still evidence of atrophy and some limited motion because of joint stiffness.

The second case of this type was in a man of 40 years. In 1941 he received injection therapy for a varicosity in the lower third of the leg. The area became sore and it was excised, and healed slowly by granulation tissue. Ever since this episode he had complained of pain in the scar, and as time went on the pain spread diffusely up the leg. It was constant; there were exacerbations from wearing a garter. In addition, swelling appeared behind the ankle and over the foot. The part took on a cyanotic discoloration; it started to perspire excessively, and was cold, clammy, and very sensitive to touch. There was no evidence of varicosis.

There were numerous periods of hospitalization, but no form of treatment afforded any relief. Psychiatric consultations were held. The record contains many remarks by consultants such as: "symptoms are definitely exaggerated"; and, "there is no obvious cause for his discomfort".

A sympathetic block was advised and carried out on January 29, 1948. There followed a complete relief of symptoms lasting at least twenty-four hours. Six days later he had a lumbar ganglionectomy including lumbar two, three, and the intervening segment of the trunk, with almost complete disappearance of symptoms.

On his discharge from hospital he had very little discomfort, the leg was warm, there was no swelling, and he felt that he was ready to start work.

I will mention two cases of thrombophlebitis.

A young woman was admitted for investigation of an old pleurisy with effusion thought to be tuberculous in origin. Two weeks previously she had been delivered of an eight months' baby by Caesarean section. Six days following admission she developed the classical picture of an acute thrombophlebitis of the deep veins of the pelvis and thigh. Four days after the onset she was given a sympathetic procain block to the upper four lumbar segments. Improvement was noted on the following day. Three days later a second injection was administered, after which the symptoms rapidly and permanently disappeared.

On inquiry the other day, twenty months following this episode, she informed me that there was no residual evidence of inflammation or venous obstruction in the leg. This result is in marked contrast to the usual story of chronic disability following this disorder.

The other case was that of a 55-year-old man. He received a shell wound of the calf of the leg during the first world war, and there had resulted a painful tender scar which had bothered him for over thirty years, frequently preventing him from performing his work. Towards the end of December 1947 he was suddenly seized with pain in his leg, upper thigh, and hip, and he noted that the leg became swollen, and the superficial veins distended. He was admitted to hospital two months following this episode with a diagnosis of thrombophlebitis of the deep iliac veins on the left side. He complained of pain in the thigh and hip, and the left leg was moderately swollen, being three inches greater in circumference than the right. In addition, the thin scar on the calf was exquisitely tender, and he would not allow palpation in this area.

After procain injections into the lumbar sympathetic trunk he obtained relief from pain in the thigh and hip, and also in the scarred area. Following a sympathectomy of lumbar 1 to 3, inclusive, there was almost complete relief of pain in both areas. The most obvious feature was the rapid subsidence of the swelling, although the superficial veins remained moderately distended.

There was one case of phantom limb pain, and it is the only one I have seen among our amputees.

While a prisoner of war he received a high femoral amputation in a German hospital. The wound became infected and healed slowly by granulation tissue. An extensive revision was done following his return to Canada, but he was unable to wear his prosthesis because of intense burning pain in the stump. This pain was related to his foot, and particularly where the great toe crossed over the second.

On examination the tissues appeared to be normal in appearance, but there were diffuse areas of hyperaesthesia.

Following his first paravertebral block on January 22 one year ago he stated that he had lost the burning pain in the stump, that he could still feel his crossed toes, but not nearly as much as before. After the second block, one week later, he had no symptoms referable to the phantom limb for several days, following which there was intermittent return. A third block was done twelve days after the second, and for the past four months he has been symptom free.

The last case I wish to mention is one of true causalgia of the classical type described by Weir-Mitchell.

This young man received a through-and-through wound of the thigh from a high explosive shell wound, sustaining an incomplete division of the sciatic nerve, with complete paralysis of the muscles supplied by the posterior tibial division. From the onset he experienced severe pain in the leg and sole of the foot. Nerve suture on two occasions was unsuccessful in restoring function or in relieving the continuous pain. In fact, as time went on, paralysis developed to involve the muscles supplied by the common peroneal division as well. The pain became unbearable and he could not tolerate the pressure of bed clothes on the foot. His state of anxiety progressed, he had difficulty in obtaining sleep, and he was in extreme mental and physical misery.

A series of three paravertebral procain blocks, in January 1947, gave partial relief only and sympathectomy was considered, but not urged as there was some doubt of its value. A whole year went by with symptoms becoming steadily worse. In January 1948 he begged to have his leg amputated, but we could not agree that this would relieve his pain. A left lumbar sympathectomy provided partial relief only, and two weeks later the nerve was resected with additional improvement, but he still had the intolerable burning pain in the foot.

On March 12, 1948, a spino-thalamic tractotomy was performed at the level of thoracic 3. At an interview one month later I gained the impression that he was the happiest man in Halifax. He was resuming his employment, could walk a mile, was gaining in weight, and sleeping without sedatives.

I shall refer later to the lessons which these cases would illustrate, but at the moment I should like to discuss the nature of these conditions, briefly. First of all, it is clear that some form of stimulus, constant in character, is a necessary factor in initiating the abnormal sequence of events. It is an unusual complication of trauma; therefore, injury in itself cannot be blamed. Why does it follow some injuries, and not others? Most authorities agree that it is more likely to occur in the mentally unstable, but otherwise it is because of happenstance. Following a fracture, in most instances the injured part is adequately immobilized. But it is the trivial fracture, often unrecognized and untreated as such, which is most prone to develop pain and prolonged swelling. Therefore, it might seem that inadequate immobilization, or excessive movement during the acute stages of traumatic inflammation, is an etiological factor. Dr. Trueta has produced experimental evidence to support this conception. I believe everyone has realized the difference, in complete healing, symptomless progress, rapid restoration to the normal state, and absence of reaction, between operation wounds treated by plaster of Paris immobilization, and those in which ordinary movement has been allowed. This may help

to explain why painful post-traumatic osteoporosis is most frequently encountered following ligamentous sprains of the wrist and ankle. These lesions are rarely treated by absolute fixation, and they involve tissues that are richly supplied with nerve endings.

Considering the nature of the stimulus further, it would seem that it must be repeated, or remain constant for a duration of time sufficient to initiate a prolonged and disturbed local effect. Repeated or continuous stimulation of the nerve endings in the loose areolar tissue about an area of thrombophlebitis, of the nerve endings enmeshed in scar tissue, or of the nerves of the ligamentous structures, are typical examples of the trigger mechanisms that may initiate this pain syndrome.

Other factors to be considered include the character of the response, and the anatomical pathways involved; these may be discussed together. We must confess to considerable ignorance both in regard to the exact nature of this reflex disturbance, and to the rôle played by the autonomic nervous system. From the vast amount of clinical and experimental studies in this problem it is clear that some form of chronic vasodilatation, or vasoconstriction, or both, is present, and represents a part of the abnormal response to the excessive peripheral stimulus. Other features of this response may be muscle spasm, trophic disturbances, and excessive sweating, as well as distorted sensory perception. However, the most curious feature of all is the pain. We can readily understand that the peripheral blood vessels, richly supplied with vasoconstrictor and vasodilator sympathetic fibres may react by abnormal vasoconstriction or vasodilatation, but to explain the mechanism of the associated pain is still a hypothetical matter.

LeRiche² claimed that the pain impulse is carried over the sympathetic nerve. Davis and Pollock³ say that it is carried over the somatic nerves, but that the irritated sympathetic nerve causes a secretion of a metabolic product which excites pain sensation in the sensory nerve. Doupe, Cullen and Chance⁴ have a theory that the qualities of causalgic pain are due to direct cross-stimulation of sensory nerve fibres by afferent sympathetic impulses at the point where the nerve trunk is injured. Homans⁵ states that the blood vessels within the larger nerves are richly supplied by vasomotor nerves. These sympathetic nerves, he

claims, rather than being truly vasomotor in nature, are related to the sensitivity of the blood vessels, carrying centrally heading impulses. Irritation to these nerves causes, through local synaptic connections in the cord, a combined sensory-vasomotor dysfunction.

Gask and Ross⁶ claim that sympathectomy works by causing an increased flow of blood, with rapid removal of tissue products, including H-substances. Dr. Takats^{7, 8} has summarized the evidence to indicate that stimulation of the posterior roots produces painful, diffusible, vasodilator substances at the nerve endings. He agrees with the postulation of Lewis, that when the disordered peripheral circulation is corrected, or improved following a sympathetic block, the chemical pain substances are neutralized. It is still not known whether the activated fibres are the ordinary sensory fibres conducting in an opposite manner, or whether there is a special set of posterior root fibres. Nor do we understand the exact nature of the chemical substances produced at the nerve endings. His theory is that as a result of excessive stimulation, at the periphery, in the second neuron within the cord, or of the third neuron in the cortex, there is produced at the nerve endings a secretion of pain producing vasodilator substances. Unless blocked or neutralized early, the disorder leads to sensitization of higher and higher levels.⁹

The neurophysiologists have given us the idea of the internuncial pool, a conception which Lorente de No¹⁰ describes as follows:

"Prolonged bombardment of pain impulses sets up a vicious circle of reflexes, spreading through a pool of many neuron connections, upward, downward, and across the spinal cord, perhaps reaching as high as the thalamus itself. Because of the summation principle of nervous impulses there is kept alive within such a pool a constant circling of activity across the synapses. These include the sympathetic motor neuron cells in the lateral horn, controlling vasomotor tone and sweat glands. Spasm in the arterioles and venules raises filtration pressure. This in turn causes oedema and swelling. Anoxaemia increases capillary permeability and filtration and therefore produces more oedema. Also emanating from the pool are augmented stimuli to pain travelling up the thalamic tract."

Livingstone¹¹ makes use of this conception of the internuncial pool, and in his monograph *Pain Mechanisms*, reasons that any procedure designed to break up the vicious circle established here may so relieve the disturbed responses that the normal physiological state is restored. The sympathetic component of this vicious ac-

tivity may be most easily eliminated, temporarily or permanently, and in many cases this procedure will allow the re-establishment of the normal responses.

He further suggests that we abandon the assumption that the activities of the sympathetic nervous system represent the essential factor in either the cause or the cure of the causalgic syndrome. He maintains that the sympathetic dysfunction is but one part of a more profound alteration of the physiological status of the spinal cord centres. The peripheral tissue changes in turn lead to additional afferent impulses which add themselves to those of the original trigger point. The trigger point starts the central disturbance, secondarily involving the sympathetic nerves and the somatic nerves. The peripheral effects of the motor activity of each of these is to initiate further afferent impulses which augment and sustain the vicious activity.

In some cases the trigger area may be eliminated without effecting a cure; and in others, sympathectomy may be done without achieving any relief. It is necessary for the underlying pathologic activity as a whole to lose its momentum. This is concentrated in the area of the internuncial pool—"the receiving station within the central nervous system which determines the routing of sensory impulses, and the dispersal of motor impulses to the periphery"—and in most cases it may best be broken up by attacking the sympathetic component.

This reflex response is unstable, and in the early stages may subside on its own, particularly when the injured part is adequately immobilized, and elevated. Or it may be abolished altogether by temporary interruption of the local nerve fibres.

Normally there is a measure of cortical control over the autonomic vascular reflexes in the cord. This control may be released, and the responses therefore exaggerated in certain states of mental anxiety, emotional stress, or instability. The important feature of the abnormality would seem to be the vicious circling of reflex activity within the internuncial pool in the spinal cord. The sustaining factors may exist not only in the area of peripheral stimulation, but also in the realm of psychic influence. It is therefore necessary to consider the anxiety state as an important integral part of the whole syndrome. Rather than disparage any attempt at treatment because

of psychic behaviour, one must try, by every means, to adjust the mental attitude. This in itself may bring about an interruption of the excessive reflex response. And on the other hand, failure to correct the disorder may very definitely result in mental deterioration.

TREATMENT

In the past the treatment of these painful states has largely been concerned with attempts to remove the local cause at its source. In early cases, when the afferent impulses can be blocked by local procain injections, or when a tender nodule can be excised, the syndrome may be interrupted. But in later cases, when the reflex disturbance has become well established, removing the source of stimulation at the periphery may prove ineffective. This particularly applies to the operation of neurolysis, a procedure often attended by disappointing results. In all early cases a trial of a suitable period of adequate immobilization, with elevation, should be given.

Earlier workers in this field obtained brilliant results from periarterial sympathectomy, and the relief obtained has afforded considerable support to the theory of the presence of chemical pain substances which were either neutralized, or washed out of the part by the temporarily augmented blood supply. In general, this method has been given up in favour of the interruption of the paravertebral ganglionated trunk. But in one or two cases where a peripheral nerve has been irritated by scar tissue, we have found it expedient to perform a periarterial stripping simultaneously with the neurolysis.

By temporarily blocking the ganglia of the sympathetic trunk with procaine, much valuable information can be obtained. If the symptoms are relieved for even a brief interval it indicates that the vicious circle has been broken, and it is a strong argument in favour of permanently interrupting the preganglionic fibres to the part, should this prove necessary. In some cases, as illustrated by the man with the injured finger, one injection only may interrupt the syndrome for months if not permanently.

It is the usual practice to repeat the paravertebral block two or more times. By this means other cases, such as the woman with the acute thrombophlebitis, and the ex-prisoner of war with the painful phantom limb, may be made symptom free. In other cases the relief

may last twenty-four or forty-eight hours, only to return. These are examples of a successful breaking of the vicious circle, but the "habit"—is it in the internuncial pool of reflexes?—has been sufficiently fixed to allow the process to start all over again. In these cases the permanent interruption of sympathectomy will be followed by favourable results in a large percentage of cases.

Unfortunately, the fixed changes in the tissues from prolonged muscle spasm, osteoporosis, joint ankylosis, and chronic oedema, may remain as accusing evidence of earlier therapeutic delinquency.

And worse still, the mental deterioration, as a result of long suffering, may evoke permanent psychic changes. Recorded cases of drug addiction, insanity, and suicide, among those suffering from true causalgia are by no means unknown. The patient may have a severe psychoneurosis because of unrelieved pain. "He acts as though his hypothalamus were being continuously stimulated. He perspires, has a rapid heart, and profound anxiety." He may have a fear of inadequate compensation, and an anxiety of permanent injury, based upon the suggestion that because no obvious organic cause can be found, no treatment has been recommended. These may aggravate the syndrome, and therefore these states of mind require adequate psychotherapy.

Unfortunately, the operation of sympathectomy may not produce the desired result, because it has been done too late, or because it has been inadequate. In the latter circumstance, as judged by postoperative sweating tests, reoperating to completely denervate the sympathetic supply has been recommended.

Perhaps the vortex of pain-producing reflexes in the spinal cord has established a self-perpetuating mechanism, from which the pain pattern registered in consciousness is too deep to be interrupted by simply removing the sympathetic component. The last case of sciatic nerve causalgia demonstrated this clearly. Fortunately, he was sufficiently relieved by a spino-thalamic tractotomy to be enabled to resume his employment.

The cases here reviewed are examples of many others. Particularly in a hospital concerned with the care of wartime injuries, one encounters an unusually large number of the post-traumatic painful states. In those who show evidence of

sympathetic disturbance, or spreading neuralgia which does not correspond to a segmental pattern, or constant, severe disabling pain, attention should be given to the possibility of this causal-gic syndrome. When recognized, active measures to correct it by eliminating the sympathetic activity may produce dramatic results. The opportunity may be lost in severe cases where this therapy is delayed.

Procain paravertebral block alone, repeated if necessary, may produce lasting cures. It may transform the whole clinical picture in acute thrombophlebitis, and we have seen that even after two months, considerable relief may follow sympathetic denervation.

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THE SYMPTOMATOLOGY OF LIVER DISEASE*

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IT is said that the liver has approximately one hundred separate connections with bodily processes. The symptoms of liver disease, therefore, are certainly very many and in writing of them it would seem to be of value to subdivide them under a number of headings. These headings will refer to body systems and a number of metabolic processes.

THE GASTRO-INTESTINAL SYSTEM

The symptoms are difficult to explain and are frequently due to other causes which may or may not be related, for example, the gastritis in alcoholism. Indigestion, flatulence, nausea and vomiting, bowel irregularity and diarrhoea are common. Anorexia may

be profound in such diseases as cirrhosis, and coating of the tongue will be observed. Abdominal pain may be complained of and is probably due to intra-abdominal vascular disturbances. The breath of the patient in liver disease, "feto hepatis," may be difficult to detect or may be very strong; it is indicative of necrosis of liver cells. Changes in the colour of the stool are significant; obstruction to the biliary system causes colourless stools, persistently clay-coloured stools are seen in obstruction due to malignant lesions, and alternating somewhat in colour in obstruction due to benign lesions, such as stones.

The liver itself may vary tremendously in size in disease. This apparently depends on the amount of fat deposited in it and the amount of regeneration or of contraction by fibrous tissue. It may be very large or very small in cirrhosis, much more commonly the latter, and extremely large in hæmochromatosis. It is tender in obstructive jaundice, nodular in cirrhosis and secondary carcinoma.

THE CARDIOVASCULAR AND CIRCULATORY SYSTEM

Congestive heart failure is the cause of a type of cirrhosis which resembles in many ways hepatic cirrhosis. Bradycardia—a non-specific symptom—is more common in obstructive types of jaundice than in others. It has three possible causes: (1) bile salts may cause direct injury to the myocardium; (2) stimulation of the vagus nerve; or (3) a reflex due to distension of bile ducts. Tachycardia developing after bradycardia in liver disease is a bad sign indicating further liver damage.

Ascites is caused by an elevation of portal venous pressure and in chronic liver disease the pressure may be five to ten times that of normal. It is not due to any great extent to changes in the plasma proteins. The symptoms of ascites will be a gain in weight, increased size of the abdomen, abdominal discomfort, dyspnoea, palpitation and weakness. The development of a collateral circulation is due to a gradual decrease in the portal vascular bed. It develops in three situations: (1) in areas where the absorbing and protecting epithelium of the gastro-intestinal tract meet—the cardiac orifice of the stomach and the anus; (2) at the site of the obliterated embryological circulation—the umbilicus; (3) situations where the

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gastro-intestinal tract or its glands are retro-peritoneal such as the duodenum, pancreas or the ascending and descending colon.

Observing the caput medusæ, the direction of the blood is classically away from the umbilicus. Hæmorrhoids are not common but œsophageal varices are said to cause 10 to 25% of the deaths in cirrhosis. The veins in the collateral circulation occupy a mid-portion of the abdomen rather than the flanks as in obstruction to the vena cava. Further, the blood flow is in the opposite direction. Infra-red photography may be used to demonstrate collateral superficial veins.

THE GENITO-URINARY SYSTEM

There are changes in the colour of the urine in jaundice due to liver disease; intermittent changes of colour in the urine suggest that the lesion is benign and a persistently deep colour signifies that the lesion is more likely malignant. Albuminuria is occasionally seen. Nephrosis may occur in infective types of hepatitis and points to a fatal prognosis. Liver disease may terminate in the so-called hepato-renal syndrome in which there is an elevation of the blood amino-acids and a decrease in the urea nitrogen with the individual showing signs of uræmia. Liver death following surgery appears to be a failure on the part of the liver to handle toxic products of destruction of its own liver cells. Death occurring within the first 48 hours following operation is apparently entirely due to liver failure but where the process is a little slower, lasting a few days, it would seem to be a combined hepato-renal failure.

THE CENTRAL NERVOUS SYSTEM

Almost all neurological and psychiatric symptoms may occur. In liver failure such things may develop as loss of concentrating ability, coma, confusion, restlessness, depression, delirium and actual psychoses. Peripheral neuropathies are possibly due to a liver deficiency but more likely to an inability of the liver to utilize vitamins normally.

A relationship exists between liver disease and disease of the brain. Experimentally, degeneration of the neurones of the corpus striatum can be produced by ligation of the common bile ducts in animals.¹ In acute liver atrophy and in cirrhosis there have been found degenerative brain changes particularly involving the glia. The most striking relationship of liver and brain disease is the occurrence of the disorder known

as hepato-lenticular degeneration or Wilson's disease.

THE HÆMATOLOGICAL SYSTEM

The liver has a number of functions in relation to the blood. (1) It produces fibrinogen, the protein necessary for the clotting of blood. The production of this substance is only rarely affected in liver disease and is not a cause of the bleeding which commonly results. (2) The production of prothrombin. Of course the common cause of bleeding is deficiency of this substance. Hæmorrhage may be spontaneous and very severe. (3) The production and storage of the anti-anæmia principle. Anæmia may develop in liver disease. It is moderate in degree, macrocytic in type, and may show spontaneous remission. It is said to respond poorly to liver therapy. It is not an important factor.

The white blood count is usually low, showing a granulocytopenia. A lymphocytosis is characteristic of infectious hepatitis and cirrhosis. The sedimentation rate is of no value. Changes in the Weltmann reaction are common.

The spleen is commonly enlarged. It is never enlarged early in obstructive jaundice. If it is enlarged one should look for other causes such as hæmolytic jaundice. It is enlarged in 80% of cases of cirrhosis (Bockus), may fluctuate in size and may shrink after hæmorrhage. It is enlarged in about 50% of cases of infectious hepatitis.

THE ENDOCRINE SYSTEM

The thyroid.—Through its connection with the rate of metabolism; the sympathetic nervous system; and its relation to other endocrine glands, it is natural to think that this gland is directly related to liver disease. Administration of thyroid substance produces depletion of liver glycogen. It is a function of the liver to decompose thyroxin. Clinically the most strongly suggestive evidence is the presence of jaundice in Graves' disease. Jaundice represents a poor prognosis in thyrotoxicosis and is sometimes associated with acute yellow atrophy.

Thyroid crises I believe are not thyroid crises but rather liver crises. Acute liver necrosis is found in people dying from thyrotoxicosis. In thyroid diseases abnormal liver function tests are found. For example, there is a close correlation between the abnormality of

the galactose tolerance test and the severity of the thyrotoxicosis. There is frequently an abnormal glucose tolerance test. The decrease in blood cholesterol found in thyrotoxicosis is consistent with the drop found in severe liver disease. The level of the blood albumen is low in Graves' disease. I would suggest that if the ability of the liver to decompose thyroxin could be increased thyrotoxicosis would not develop. This can be done by providing a high calorie, high vitamin and high carbohydrate diet in the preparation of the patient for thyroidectomy. The restoration of the liver glycogen enables the liver to carry on its work in a more normal manner.

The gonadal system.—The liver is responsible for the inactivation of oestrogens. Therefore in liver disease there may be abnormalities of menstrual flow; usually the flow is increased in both amount and frequency. In some liver diseases there may be regression of secondary sexual characteristics as manifested by scantiness of pubic and axillary hair and in men a feminine distribution of pubic hair, sparseness of beard, atrophy and diminution of size of testes. Bilateral enlargement of the breasts during convalescence from infectious hepatitis of the homologous serum type may occur. This is explained as the result of a failure on the part of the liver to inactivate oestrogen.

SKIN ABNORMALITIES

In liver disease the skin is often muddy and pale, dry and inelastic. Pruritus is variable. It is infrequent in hepatitis, more common in obstructive jaundice and much more frequent when the obstruction is due to carcinoma. Further and perhaps more important abnormalities are noted. The first, a vascular abnormality called the "spider nevus" is a bright red lesion with a central point from which radiate fine hair-like branches for a distance of about 1 cm. It consists of an arteriole and its branches and is found on the sternum, over the upper thorax, shoulders and occasionally on the trunk and limbs. It is stated to occur only in cirrhosis. These may recede with improvement in the disease. They may bleed. The elongated and dilated venules observed over the lower ribs or over the alæ nasi have nothing to do with liver disease and are of no diagnostic significance.

The second important one is the "liver palm". This consists of an intense flushing of

the thenar and hypothenar eminences. It is observed in active cirrhosis and may disappear after the disease becomes quiescent. It is said to occur in some deficiency diseases.

The skin of hæmochromatosis, the disease of iron metabolism which is associated with cirrhosis of the liver, produces a diffuse bronzing or a bluish, slaty, metallic tinge to the skin.

SYMPTOMS RELATED TO PROTEIN METABOLISM

Many of the symptoms of hepatic disease are due to disturbances of protein metabolism. The liver is of course the site of the formation of the plasma albumen. Such symptoms as weakness, loss of weight, loss of appetite and oedema are therefore due to changes in this metabolic process. Oedema occurs in 35% of cases of cirrhosis and it usually involves the lower portions of the body. Hydrothorax fluid in cirrhosis often contains blood. A picture of advanced cirrhosis with the wasting, the abdomen distended with fluid, the thin and spindly legs, the sunken chest, the hair often thin and lifeless, the thin and drawn face and sunken eyes and temporal regions, demonstrate the lack of protein available to maintain bodily tissues.

SYMPTOMS RELATED TO FAT METABOLISM

Liver disease is associated with excessive deposits of fat in the liver. The factors responsible are those that cause liver disease; *e.g.*, (1) starvation with diet perhaps high in fat but deficient in choline, protein, vitamins; (2) infections such as tuberculosis, streptococcal infections or typhoid; (3) poisons such as alcohol, chloroform, benzene, etc.; (4) diabetes, Graves' disease, pregnancy, pernicious anaemia; (5) anoxia as in shock, cardiovascular disease, high altitude, anaemia; (6) increased basal metabolic rate as in leukaemia, etc.; (7) loss of protein from draining sinuses.

The symptoms are those of a fasting hypoglycaemia due to loss of liver glycogen with alterations of the glucose tolerance curves producing a diabetic type. There is a tendency to ketosis with a low respiratory quotient and a tendency to acidosis. These people are very susceptible to infection. They may develop an acute hepatic insufficiency at any time, for example, the death of many alcoholics is due to this failure.

There are a number of disorders of lipid metabolism associated with liver disease. Most of them seem to have the following characteristics: (1) jaundice, often of years' duration; (2) enlargement of liver and spleen; (3) xanthomatous lesions of the skin; and (4) a high blood cholesterol.

SYMPTOMS RELATED TO CARBOHYDRATE METABOLISM

Some of these symptoms are related as described above to disturbances of fat metabolism. A syndrome of liver disease resembling diabetes is described by Portis. In this there are: (1) chronic gallbladder disease; (2) hyperglycæmia; (3) glycosuria, but with no ketosis. It is produced by an inability of the liver to store sugar but retaining its ability to break it down. With insulin glycogen is further broken down from the liver and its store of this substance therefore reduced. The protective effect of glycogen is thus lost and further hepatic injury occurs. Rather than give insulin, sugar restores the normal glucose tolerance by restoring the liver glycogen which is necessary for the health of the organ.

The second important but rare disturbance of carbohydrate metabolism is von Gierke's disease. In this condition there is a defect of the liver, an inability to break down glycogen. It is discovered early in childhood, affects both sexes, and inheritance and consanguinity are of importance. These children have a large abdomen, increased abdominal and trunk adipose tissue, delayed growth in the extremities and a large full face. Occasionally symptoms of hypoglycæmia and vomiting due to ketosis are observed. Some may have steatorrhœa. There is enlargement of the liver but no ascites. The heart may be enlarged. There is a low blood sugar but a high blood glycogen. There is an increased sensitivity to insulin and adrenalin produces no effect in raising the blood sugar. There is a hyperlipæmia, blood cholesterol is markedly increased, and ketone bodies are found in the blood and urine.

SYMPTOMS RELATED TO THE METABOLISM OF BILIRUBIN

Jaundice of course is not necessarily a symptom of liver disease. It may be present or absent in very severe liver disease. Jaundice is classified according to McNee as: (1) obstructive, the cause of which is some definite

obstruction to the outflow of bile; (2) hepatocellular or hepatogenous due to disease of the parenchymatous cells of the liver; (3) hæmolytic, due to increased production of bilirubin secondary to an increased breakdown of red blood corpuscles; (4) mixed forms of jaundice.

These are differentiated by careful clinical and laboratory methods referred to later. Discoloration of the skin is a poor guide to the level of the blood bilirubin. The skin stores bilirubin and only releases it very slowly. There is jaundice in almost 50% of cases of cirrhosis. I note that jaundice in infectious hepatitis lasting longer than three weeks spells severe liver damage or acute liver atrophy and death.

There is some significance in the various shades of icterus in the skin. The skin is not only stained with bilirubin but also by some of the oxidation products such as biliverdin and cholecyanin. Jaundice due to bilirubin itself produces a yellow-red-brown colour and indicates a recent obstruction high in the biliary tree. Jaundice due to oxidation products gives a yellow-greenish colour and signifies a low obstruction of long duration resulting from stagnation.

LIVER FUNCTION TESTS

These tests are not so much tests of liver function as they are determinations of certain biochemical changes which occur during the course of hepatic disease. They are usually classified as follows: (1) on the metabolism of bilirubin; (2) on the ability of the liver to excrete foreign substances, such as dye; (3) relation to carbohydrate metabolism; (4) relation to protein metabolism; (5) relation to fat metabolism; (6) on the detoxifying function of the liver.

The metabolism of bilirubin.—Bilirubin is measured by the icterus index and the van den Bergh test. The icterus index does not measure a specific substance, but rather the degree of yellowness of the serum. As this is affected by many other conditions the icterus index should be considered obsolete. The van den Bergh measures a specific substance and is therefore more accurate. The qualitative van den Bergh does not seem to be of practical clinical value. It is better to determine the quantitative serum bilirubin and, as recommended by Professor Meakins, to express the direct reacting pigment

as a fraction of the total pigment. The direct reacting type constitutes from 35 to 70% of the normal serum bilirubin of the blood. High fractions then indicate an obstructive type of jaundice and low fractions a hæmolytic type. There is a bilirubin excretion test which is useful and accurate in detecting latent liver disease not due to obstruction.

With reference to urobilinogen it will be remembered that bilirubin on reaching the bowel is acted on by the colon bacillus to produce urobilinogen. A large part of this urobilinogen is excreted in the fæces. Part, however, is absorbed and is excreted both by the liver and by the kidney. Therefore most valuable tests are the quantitative measurements of the urobilinogen in both urine and fæces. It is significant in the differential diagnosis of jaundice. In the case of a stone in the common duct some urobilinogen will be found in both urine and fæces, that is, that in this type of obstruction the blockage is rarely complete and some bile passes perhaps intermittently. On the other hand in obstruction due to carcinoma the blockage is complete and no urobilinogen will be found in either stool or urine.

In acute liver disease there is at first no excretion of bilirubin and therefore no urobilinogen in urine or fæces. Later there is some excretion of bile but the liver is unable to excrete urobilinogen because of the disease and so abnormally increased amounts are found in the urine.

Tests based on the ability of the liver to excrete dyes.—The bromsulphalein is a useful test in chronic liver disease and is of value in the differential diagnosis of such symptoms as ascites and upper intestinal hæmorrhage. It is not used in the presence of jaundice and has no value in obstructive jaundice. A positive test is a definite indication of liver disease. It is not a sensitive test.

Tests related to carbohydrate metabolism.—The galactose tolerance test is the one of greatest value. It is specifically used in the differential diagnosis of jaundice due to acute diffuse liver injury. It is of no value in chronic liver disease. Galactose is used because it is readily absorbed, has no kidney threshold, is utilized largely by the liver and is not affected by other factors such as insulin. It is positive in 80% of cases of catarrhal jaundice and only 5% of cases of obstructive jaundice. The liver soon

regains its ability to handle galactose, so that the time element is important and the test must be done early in the disease. If the test is negative early in the course of jaundice an obstructive type is indicated but if done late it is of no significance. The glucose tolerance test is of doubtful value because glucose is affected by so many other factors.

Tests related to protein metabolism.—The liver, as mentioned before, is the site of the synthesis of serum albumin. A decrease in serum albumen is present in a high percentage of cases of chronic liver disease. The total serum protein may be normal and this is accounted for by the finding of a high globulin in these cases of chronic liver disease. A high globulin is rare otherwise and is found in only one or two other diseases such as kala azar and disseminated lupus erythematosus. The gravity of the prognosis is proportionate to the albumen decrease.

The cephalin cholesterol flocculation test is one related to the plasma proteins. It depends for its reaction on the presence of some abnormal globulin in liver disease. It is not a test of functional capacity of the liver but rather an index of active liver disease affecting the parenchymatous cells. It may disclose disease frequently when it is not being diagnosed otherwise. It is a test of extreme sensitivity and found positive in such conditions as cirrhosis, liver injury due to chemicals, and catarrhal and homologous serum jaundice.

The blood prothrombin concentration. Prothrombin is one of the plasma proteins. The prothrombin time or the prothrombin concentration should always be done in liver disease, particularly where surgery is anticipated. The liver is the site of the formation of prothrombin. This test must be done in conjunction with the administration of vitamin K. An abnormal prothrombin time is only significant of liver disease if it remains prolonged after giving vitamin K. The test measures a specific function but not all serious liver disease has a lowered prothrombin concentration.

The thymol turbidity test is an important sensitive test of liver disease, having the same significance as the cephalin cholesterol flocculation test.

Tests related to lipid metabolism.—These tests are the blood cholesterol ester and total cholesterol ratio. There are changes in the blood cholesterol in other diseases such as

Graves' disease, nephrosis, pregnancy and advanced arteriosclerosis. These changes however may be due to the effect of the disease on the liver.

In obstructive jaundice there is an increase in the total cholesterol; it may be over 300 mgm. %. The elevation corresponds to the serum bilirubin. If the cholesterol is not elevated there is likely a complication of active liver damage. More striking is the decrease of the esterified portion of the cholesterol. The liver is responsible for the production of this portion of the cholesterol. The decrease of the esterified portion is roughly parallel to the degree of liver cell injury. With recovery there is a return of this portion of the total cholesterol. In hepatogenous jaundice there is usually a decrease in both the total and the esterified portion of the cholesterol. The test is most important in distinguishing between obstructive and hepatogenous jaundice.

Tests based on the detoxifying property of the liver.—The hippuric acid test. Sodium benzoate is conjugated with glycine in the liver to form hippuric acid. It is therefore a measure of the glycine-forming capacity of the liver. Normal renal function should be ensured by doing a urea clearance or concentration test. Some consider it very useful but there are a number of opportunities for error. It is used in both acute and chronic liver disease.

CONCLUSIONS WITH REGARD TO LIVER FUNCTION TESTS

There are a great number of tests, none of which is able to exclude the possibility of the existence of liver disease. Some are difficult to do. They can give a great deal of information and can be of real assistance. They may be of value in (1) the recognition of latent liver disease; (2) the differential diagnosis of symptoms of possible hepatic origin, such as ascites, upper gastro-intestinal hæmorrhage or œdema; (3) the differential diagnosis of jaundice—here they are best used in the first ten days and before liver damage takes place; (4) determination of liver injury secondary to biliary obstruction; (5) following the course of jaundice; (6) detecting residual liver damage and continued activity of liver disease.

In the diagnosis of liver disease careful history and physical examination are as always important. Authorities appreciate the diffi-

culties in accurate diagnosis and require the use of the laboratory and the pathologist for liver biopsy and other procedures.

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AN EPISODE OF CARBON TETRACHLORIDE POISONING WITH RENAL COMPLICATIONS*

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THE dangers associated with the use of carbon tetrachloride are often not fully appreciated by the many individuals who handle this material in the course of their work, or who may use it incidentally. Being non-inflammable, and a cheap and excellent solvent of greases, oils and waxes, it is used extensively, not only in industry, but in our offices and homes as a dry-cleaning and degreasing agent. In addition, its properties of non-inflammability, high vapour density and relatively high volatility at ordinary temperature make it an effective fire extinguishing agent, the carbon tetrachloride vapour displacing the air which is necessary to support combustion. The use of the material as an anthelmintic is one with which the medical profession is quite familiar, and no emphasis is needed here on the toxic effect of ingested carbon tetrachloride

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on the liver. The purpose of this communication is to remind the profession of the dangers associated especially with the non-medical uses of carbon tetrachloride and to illustrate, with two well studied cases, one of which recovered and the other died, the profound effects on renal function which may follow the inhalation of the vapour.

Carbon tetrachloride (CCl_4) is a colourless liquid having an odour very similar to that of chloroform. Its specific gravity is 1.58 (water = 1). It boils at 170°F ., and at ordinary temperatures is only slightly less volatile than chloroform. The vapour density is 5.3 (air = 1). Carbon tetrachloride is soluble in ether, alcohol, chloroform, benzol, gasoline and most fixed and volatile oils. It is only very slightly soluble in water. The commercial product contains impurities which may be toxic, especially carbon disulphide, hydrogen sulphide, hydrochloric acid, phosgene and organic chlorine and sulphur compounds. In the presence of heat and moisture, carbon tetrachloride partially decomposes, forming phosgene and hydrochloric acid.

Details of exposure.—On the morning of December 26, 1947, 10 men were exposed to the fumes of carbon tetrachloride used in a de-

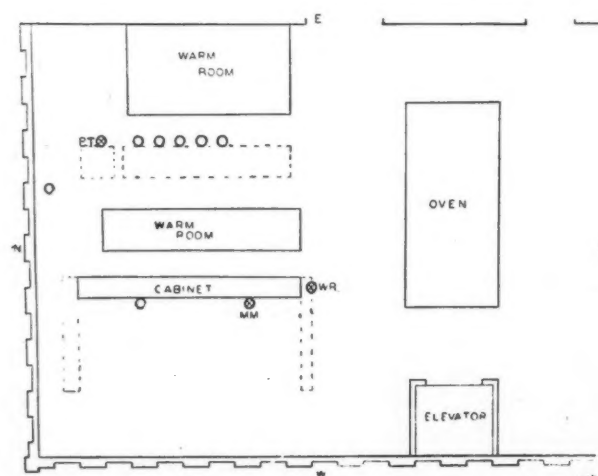


Fig. 1.—Plan of work area and circles indicate position of men.

greasing operation. The exposure occurred in a work area 67 feet long, 59 feet wide and approximately 10 feet high. This work area was part of a much larger room but was effectively isolated from it by an elevator shaft and a rectangular block of ovens. Windows were situated along two sides of the room. The work area contained three large pieces of equipment. The first of these was a large cabinet 34 feet long, 3 feet wide and 6 feet tall, standing some 18 inches above the floor and extending to within $2\frac{1}{2}$ feet of the ceiling. The other two large pieces of equipment were "warm rooms". Essentially, these were large, insulated, rectangular boxes. One of these "warm rooms"

because of its size and situation offered some obstruction to air movement in the work area. The remainder of the equipment consisted of tables, benches, and conveyor belts, and did not interfere with air movement (Fig. 1).

The cabinet mentioned above contained a conveyor belt having a total length of some 1,000 feet. This belt was composed of small metal rods, 3 feet in length, running transversely across the width of the cabinet and spaced $\frac{1}{2}$ inch apart. The belt travelled back and forth from one end of the cabinet to the other, with a distance of about 3 inches between successive layers of the belt. Altogether there were 30 layers of belt moving through the cabinet. Grease which collected on the belt was removed about once every 3 to 4 weeks. This was usually done by three men during the week-end when other employees were absent. Carbon tetrachloride had been used for several years for this purpose but had never been attended by any ill effects.

At 8.30 on the morning of December 26, three employees commenced this cleaning operation. During the morning there were seven other employees in the work area, some 25 feet from the cabinet (see Fig. 1). A total of 10 to 12 gallons of carbon tetrachloride was used in open buckets. During the cleaning process, the men stood on metal drums, with their pails at their feet. The sectional doors which made up both sides of the cabinet were swung open, and the men started cleaning the top layers of the conveyor belt, worked down, and then moved along to the next section of the cabinet. The belt was washed by dipping a brush into the pail and then reaching into the cabinet between the layers of the belt and brushing the transverse metal rods. In order to reach across the belt, it was necessary for a cleaner to bend forward and push his arm between the belt layers as far as he could reach, thus bringing his face close to the surface being cleaned.

The windows were not open during the first hour or so of the cleaning operation but were opened subsequently. During the morning, the cleaners stopped work on several occasions and left the work area for a breath of fresh air. The cleaning operation was completed about noon. Excess carbon tetrachloride must certainly have collected in drip pans at the bottom of the cabinet, but as far as could be learned, this excess was never removed, so that the total

quantity of carbon tetrachloride vaporized was between 10 and 12 gallons.

Provided there were no changes of air in the work area, and that the vapour was evenly distributed in the atmosphere, the evaporation of this quantity of carbon tetrachloride would produce a concentration of the vapour in the air of about 10,000 parts per million, a concentration which must certainly be regarded as dangerous if breathed over a period of several hours. The maximum allowable concentration recommended by the Ontario Division of Industrial Hygiene for repeated prolonged exposure is but 50 to 100 parts per million. With the windows open, however, two factors were introduced, the first, a dispersion of the vapour into other parts of the building, this factor tending to lower the concentration in the work area. The second factor introduced is associated with the shape and position of the equipment in the area. The cabinet itself, and the "warm room" beside it, both of which were over 30 feet in length and reached almost to the ceiling, would doubtless have the effect of preventing free circulation of the air, and tend to create local currents and eddies. Though no attempt was made to determine air velocities in various parts of the work area, it is reasonable to assume that the carbon tetrachloride vapour must have been unevenly distributed throughout the area. This tendency to local concentration would be enhanced by the fact that the vapour is over 5 times heavier than air, and would not tend to diffuse over the top of the "warm room". The latter was not in use during the day in question, and there was no other source of heat in the vicinity so that the effects of heat did not complicate the exposure.

Of the 3 cleaners, one (M.M.) was sick with nausea and vomiting and under the care of his doctor at home for 4 days only. A second cleaner (W.R.) was hospitalized and later died. The third cleaner denied having any symptoms following his exposure. In the group of 7 men present in the work area some 25 feet from the degreasing operation, only one, (P.T.) became ill and was subsequently admitted to another hospital.

CASE 1

P.T., a 42-year-old male, was first seen on January 2, complaining of nausea and vomiting, epigastric pain, constipation, backache and headache beginning December 27, and oliguria beginning December 29. The latter progressed to a point where he passed only a fraction of an ounce of urine daily.

He admitted drinking his share of a 26 ounce bottle of whiskey on Christmas Eve and 4 to 5 bottles of beer on Christmas, and the first impression was that he had a urinary retention from the use of alcohol. When catheterized however, only about 20 c.c. of amber-coloured urine were obtained, showing only a few pus cells on microscopic examination and a trace of albumin. There was moderate epigastric discomfort on pressure but no costovertebral tenderness. He gave no history of previous genito-urinary trouble and denied having ever received sulfonamides for any reason. The cardiovascular system was normal and the blood pressure was 130/90. His temperature was normal and the fundi showed no gross changes.

On January 4, he was admitted to hospital with the diagnosis of anuric uræmia, the cause to be determined. His blood non-protein nitrogen on admission was found to be 177 mgm. % and the carbon dioxide combining power 38.1 volumes %. He showed an inability to concentrate his urine, the specific gravity being 1.011. The urine continued to show a trace of albumin, but the cellular constituents had increased to 150 to 200 red blood cells and 35 to 40 pus cells per high power field. He was given 2,800 c.c. of sodium lactate solution on January 6, to control his acidosis and to encourage diuresis. Following this, however, the patient displayed gross oedema of his ankles, face and hands, and became somewhat irrational.

From the time of his admission, he began to put out increasing amounts of urine, and on January 10, he voided the unexpectedly large amount of 2,050 c.c. However, his blood non-protein nitrogen continued to rise to a high of 199 mgm. % on January 12, and his blood creatinine reached a peak of 20.5 mgm. % on January 13, after which however, both began to fall. The oedema disappeared as did the nausea and vomiting and the patient took on a sense of well-being with his increase in urinary output.

Further investigation revealed no other physical defects, a normal retrograde pyelogram, negative urine cultures and a normal blood picture. The urine was tested for arsenic, mercury, lead, copper and zinc but none was found.

Until January 13, no explanation was forthcoming as a cause of this man's illness except that our biochemist, while previously attempting to do a van den Bergh test repeatedly encountered an interfering substance which in his experience was usually the result of sulfonamide therapy. However, we were loath to accept this plausible explanation in the light of the patient's persistent denial of the use of such drugs. On January 13 however, we learned that a fellow employee had been admitted to another hospital in the city with oliguria and pulmonary oedema said to be due to an exposure to carbon tetrachloride received in his work as a cleaner. With this information P.T. vividly recalled a 3 to 4 hour exposure to the vapour from this substance while it was being used to clean a conveyor belt some 25 feet from him the day after Christmas. It had never occurred to him that this exposure might have been significant. At noon on the same day he had been unable to eat his lunch and complained of drowsiness and fatigue and the next day developed the symptoms described. He remembered also a period of nausea of a few hours' duration following a similar cleaning episode several months previously.

The clinical investigation that followed was fairly complete. A two-hour kidney function test on February 6 showed a night urine somewhat in excess of the day urine with a reduced range of specific gravities between 1.014 and 1.019. A phenolsulphonphthalein kidney function test done January 26 showed only 11% elimination of the dye at the end of two hours, increasing however to 31% on February 9 and within normal limits by February 13 with a 73% elimination. Blood non-protein nitrogen and creatinine levels returned to normal and the urine ceased to show evidence of blood or pus cells, continuing however, to show a very slight trace of albumin. A dilution test done just before discharge on February 14, gave a result just within normal limits.

Repeated van den Bergh, Hanger flocculation and bromsulphthalein tests of liver function showed no evidence of damage. However, a hippuric acid test done January 29, showed only 79% synthesis of hippuric acid from the sodium benzoate ingested as compared with the accepted normal of 85 to 110% synthesis. From this it was postulated that the liver had not come through the exposure entirely unscathed.

When discharged from hospital February 14, the patient was feeling perfectly well and had apparently made a complete recovery from an acute toxic nephrosis due to carbon tetrachloride.

CASE 2

W.R., a 39-year-old male, had been in charge of the degreasing operation and had been exposed every three to four weeks to the fumes of carbon tetrachloride for approximately 16 months previous to the massive exposure occurring on December 26. He was known by habit to frequent the beverage rooms but we can only speculate as to the amount of drinking done over the holiday. On December 28 he first complained of severe nausea, vomiting, backache and headache, but continued to work off and on feeling very weak, tired and constantly nauseated. Suddenly, on January 8, 1948, he developed marked shortness of breath and had a convulsive attack. At this time, he was seen by his family doctor who admitted him to hospital.

The urine on admission revealed a specific gravity of 1.012, was acid in reaction with slight albuminuria and a few white blood cells. The haemoglobin was 69%, the red blood count 3,600,000 and the white blood count

10,200. The day following, January 9, the blood non-protein nitrogen reading was 173 mgm. %. A fasting blood sugar was 137 mgm. %.

For the first three days in hospital the patient was treated as a case of chronic nephritis until the history of exposure was clarified. On January 10, oliguria became a marked feature and the next day the patient developed gross oedema of the lungs, marked dyspnoea and subsequent cyanosis. There was no evidence of pendent oedema or jaundice, and neither liver nor spleen could be palpated. Blood pressure at this time was 136/80. Laboratory examination on January 13 revealed an icteric index of 8 units, a negative van den Bergh and negative urine tests for bilirubin and urobilin. The non-protein nitrogen in the blood had risen to 213 mgm. %. On January 12 the temperature, pulse and respiration became elevated to 101°, 110 and 36 and remained thus until the patient's death on January 13. Death was attributed to acute pulmonary oedema, probably secondary to the uraemia.

At autopsy the following conditions were found: intense oedema of the lungs associated with bilateral hydrothorax, lower nephron type of nephrosis, disseminated central necrosis of the liver, oedema of the brain with tentorial and cerebellar coning, mucosal injection of the duodenojejunal junction and an acute dilatation of the stomach.

The lungs were light brown in colour and filled with frothy fluid. Apart from the generalized oedema, an interesting feature was a fine diffuse, interstitial fibrosis, particularly pronounced in the lower lobes of both lungs. This fibrotic reaction made up of young, distorted fibro-

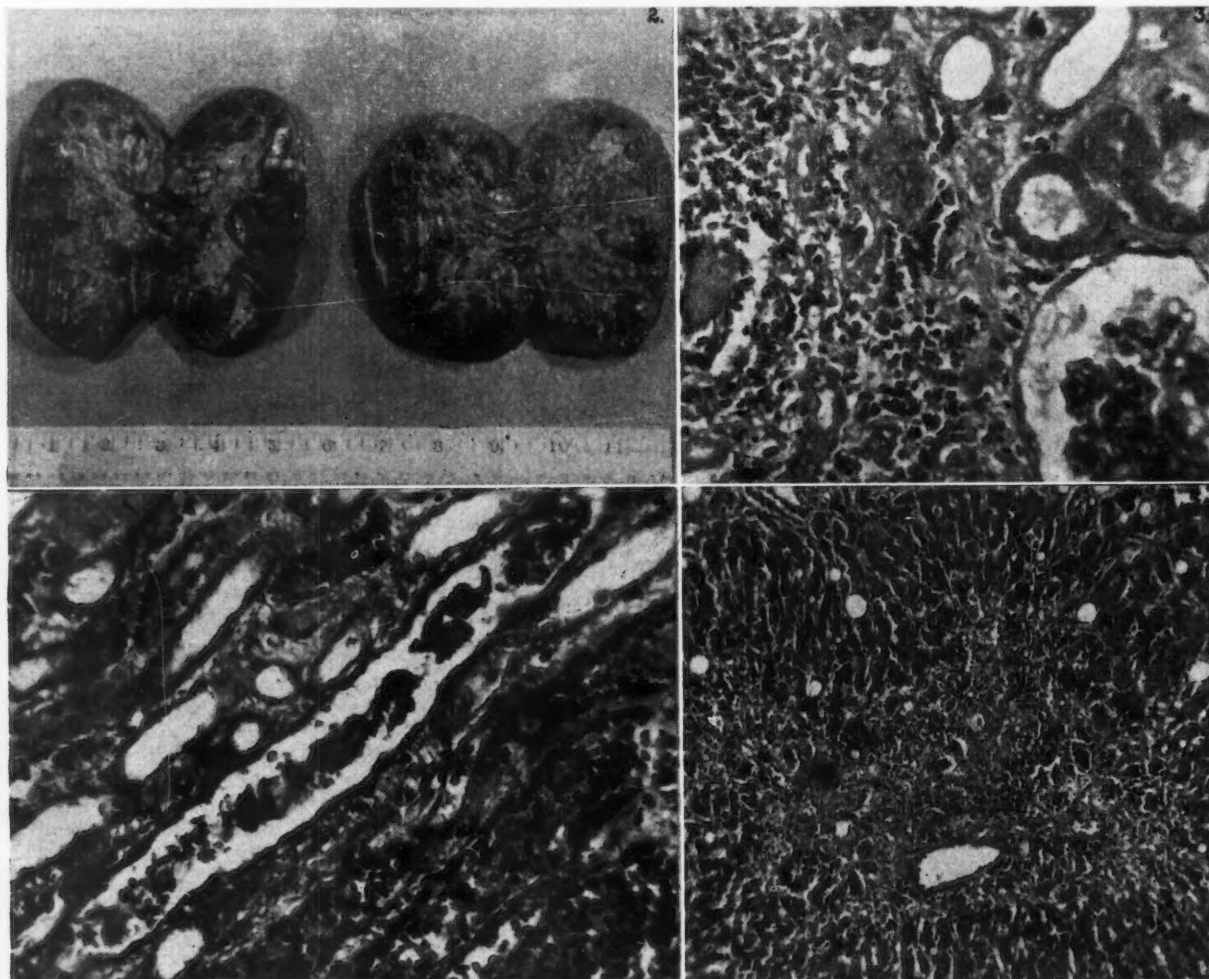


Fig. 2.—Enlarged kidneys showing clear demarcation between cortex and medulla. Fig. 3.—Basophilic cast and surrounding inflammatory reaction. Protein within Bowman's space. Swelling of convoluted tubules (x 200). Fig. 4.—Pronounced congestion of vasa recta and cast within tubule (x 200). Fig. 5.—Central zonal necrosis of liver (x 200).

blasts and early deposition of collagen was particularly marked in the interalveolar sites. Curiously enough, in the regions of this fine reticular fibrosis, small incarcerated globules of intracapillary and extracapillary neutral fat were demonstrated by Sudan IV and Nile blue sulphate. It was rather interesting to speculate on the presence of these fat globules. It was considered that they possibly represented a manifestation of fat embolism, resulting from previous exposure to carbon tetrachloride. Possibly as a result of the solvent action of this hydrocarbon, the plasma became supersaturated with fat. Globules were deposited in the lung capillaries when the solvent was exhaled and these acted as foreign bodies. Soma Weiss and MacMahon, in 1928, described a case of fat embolism following carbon tetrachloride poisoning.

The kidneys were enlarged (Fig. 2). The cortices were swollen, pale yellow and tense and the medullary pyramids were streaked with red. There was no evidence of antecedent scarring. The glomeruli were intact and in Bowman's spaces there was a fine protein precipitate. The convoluted tubules were filled with albuminous material. The luminal edges of the proximal convoluted tubular cells were frayed with considerable loss of brush borders. These cells were swollen and in places gave a stellate appearance to the lumen. The limbs of Henle showed early necrosis and in the distal convoluted tubules particularly, there was desquamation of the tubular lining cells, with an occasional orange-coloured or basophilic pigment cast (Fig. 3). In the intermediate zone, an occasional focus was demonstrated where a basophilic cast had ruptured through the tubules into the interstitial tissue and was surrounded by an inflammatory infiltrate made up of lymphocytes, mononuclears and eosinophils. There was marked congestion of the vasa recta, extending the entire length of the medulla (Fig. 4). No embolic fat was demonstrated in the glomerular capillaries, but fine fat globules were found in the distal convoluted tubules, and a few within the vasa recta. This picture in the kidneys was that of a lower nephron nephrosis.

In the gross, the mahogany red colour of the liver was replaced by a nut brown, the consistency was slightly softer than normal and there was some loss of the normal structural markings. Microscopic examination showed marked centrilobular necrosis (Fig. 5). It was estimated from the morphological picture that this necrosis had required 7 to 17 days to develop. The liver cells had dropped out of these necrotic zones. In addition, there was a fine, irregular, fibroblastic stroma in the central zones. Hemosiderin-laden macrophages were also found in these regions. A few large, irregular degenerating liver cells were found forming a court surrounding the zonal necrosis. Large fat globules were particularly marked in the central regions with stringing out in a pearl-like fashion to the periphery of the liver lobule. The middle and outer zones of the parenchyma were perfectly intact. There was no evidence of fibrosis in the periportal regions.

DISCUSSION

Of interest in the present episode of carbon tetrachloride poisoning is the variation in response shown by the individuals exposed. This variation has been noted repeatedly in previous reports of poisoning following the inhalation of the vapour. The explanation is seldom clear, and the variation is frequently attributed to differences in "individual susceptibility". In the present incident the 3 men employed on the degreasing operation must certainly have been exposed to very high local concentrations of carbon tetrachloride vapour for a period of

about 3 hours. The man who died had had repeated exposures to the solvent at intervals of three to four weeks for 16 months. No evidence was found that he had ever complained of ill effects from these exposures. There had been no deviation from the usual procedure used in the degreasing operation except that the quantity of carbon tetrachloride used latterly was somewhat greater than the 5 to 10 gallons used on previous occasions. This fact may account, at least partially, for the severity of injury produced by the last exposure. The rôle played by the repeated previous exposure is more difficult to assess but must be borne in mind in a consideration of the effects of carbon tetrachloride poisoning.

The other two cleaners had never had previous exposure to the solvent, but one hesitates to conclude that this fact alone accounts for the comparatively mild injury sustained by one and the absence of symptoms in the other. It is possible that the cleaner not affected was exposed to lower concentrations of the vapour because of local air currents, or perhaps he used less solvent. He admitted going to the window every 10 or 15 minutes for fresh air and was inclined to attribute his escape from symptoms to this practice.

The reason for the serious poisoning sustained by P.T. is also not entirely apparent. The most plausible explanation is that he worked in a high local concentration, an eddy created by the position of the "warm room" (near the centre of the work area) in relation to draughts from the windows. This possibility is given some support by the statement made by the men who worked on either side of him that the odour of the solvent was very strong in their vicinity. The remaining 3 men, some 15 feet to the left, denied noticing any odour.

Another point worthy of consideration is the fact that the episode occurred just after Christmas—a time of celebration. Of the men most seriously affected, one admitted the drinking of alcoholic beverages during the two days preceding the exposure. The other, who later died, was reported to be a fairly regular consumer of beer. Though one cannot conclude that consumption of alcohol enhances the toxicity of the chlorinated hydrocarbon, the frequency with which a history of ingestion of alcohol has been noted in cases of serious

carbon tetrachloride poisoning causes one to wonder if this fact may not be significant.

The case of P.T. illustrates the difficulties that the general practitioner may encounter in obtaining a history of exposure to carbon tetrachloride or other potentially toxic materials. This patient knew the offending substance by name, knew too that in high concentrations it might make one "dopey" and even "sick at the stomach". He was subconsciously reassured however, by the fact that it had been used frequently in the past without apparent ill effects. For over two weeks after hospitalization he did not associate his illness with his exposure to carbon tetrachloride. Even after being told by his doctors that he had been poisoned, the source and the substance remained a mystery. It was not until the appearance of the second case of carbon tetrachloride poisoning and the patient was questioned directly that a history of exposure was obtained.

Clinically there are two interesting features in connection with this case. One of these is the apparent severity of the effects on renal function and the other is the complete physiological restitution that followed. As a result of the oliguria his blood non-protein nitrogen rose in the course of several weeks to 199 mgm. % and his blood creatinine, considered of grave significance if over 5.0 mgm. rose to a high of 20.5 mgm. %. The creatinine determination does not have the same prognostic significance in the presence of tubular damage as it has in glomerular disease. The creatinine level does however leave little doubt of the profound disturbance of renal function. This was further substantiated by kidney function tests performed a month after the exposure which revealed gross impairment of function, though the non-protein nitrogen substances had returned to normal. Three weeks later, when discharged from hospital the patient had apparently made a complete recovery with no evident permanent impairment of kidney function.

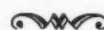
The encountering of a substance in the blood that interfered with the van den Bergh determination brought up a novel problem and one worthy of future consideration. Apparently this substance was not a sulfonamide or a derivative as was suggested at first. Rather it seemed to be a product of the uræmia and it is known to

have been encountered at least once since in a patient with uræmia where sulfonamides and carbon tetrachloride were not etiological factors.

Several important features should be stressed in the fatal case of carbon tetrachloride poisoning. The early widespread central necrosis of the liver represents the effect of the carbon tetrachloride upon the absorptive central zone of the lobule. The phenomenon as indicated by Hims-worth and Glynn is that there is initially a parenchymal swelling in this region with a compression of the liver sinusoids ultimately resulting in a necrosis of the central zone. The second interesting feature is the presence of a lower nephron nephrosis. The term "lower nephron nephrosis" has been introduced by Balduin Lucké and is synonymous with the terms "kidney of traumatic uræmia", "tubulovascular syndrome", "kidney of crush syndrome" and "hæmoglobinuric nephrosis" of Mallory. W. W. Woods was probably the first to draw attention to three fatal cases of carbon tetrachloride poisoning showing lower nephron nephrosis. In reviewing Hans Smetana's article, there were a number of cases of carbon tetrachloride poisoning which, likewise, showed a high incidence of pigment nephropathy although Smetana did not strictly label this group as lower nephron nephrosis as Lucké and W. W. Woods have done. The third interesting feature was the presence in the lungs of incarcerated globules of fat in the regions of interstitial fibrosis. Could it be possible that these streaks of fibrous tissue represent a reparative reaction to an antecedent liberation of embolic fat fragments in the pulmonary capillaries resulting from previous minimal exposures whilst carrying out degreasing operations?

In conclusion, it should be pointed out that exposure to fumes of carbon tetrachloride is fairly common and many cases of poisoning have been reported in the literature, that probably many subclinical and unrecognized cases occur, that individual susceptibility varies and is probably enhanced by the use of alcohol and that where massive exposure has occurred renal involvement is frequent and pronounced and may dominate the picture.

We gratefully acknowledge the supervision and interest shown by Dr. Hurst Brown, Dr. N. W. Roome, and Dr. J. L. Burns in these cases.



VENOUS CATHETERIZATION, A REVIEW*

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THE passage of a catheter from the ante-cubital vein of the arm to the right heart was first accomplished by Forsmann¹ in 1929. He used himself as the subject. Since that time the technique has been used in visualizing the heart and great vessels by means of contrast media, a method known as angio-cardiography. The radio-opaque dye is introduced directly into the arm veins or through a catheter directly into the great veins or heart chambers. Robb and Steinberg^{2, 15, 16} described an excellent method in 1938. Valuable information is gained by this procedure. The position, size and shape of the heart and great vessels have been studied, and many physiological and anatomical problems thus clarified. Clinically it has been used in the differential diagnosis of aortic aneurysms, mediastinal tumours and congenital anomalies of the heart, great vessels and pulmonary circulation.^{3, 4} Van Diggelen,⁵ himself the victim of congenital coarctation of the aorta, has written an excellent subjective account of the full investigation, including angio-cardiography and the later successful operation and convalescence.

A report by Padilla and his co-workers^{6, 7} appeared in 1932 in which direct intracardiac administration of heroin drugs was accomplished in cases of shock and syncope. They also studied the local (*i.e.*, intra-cardiac, via catheter) administration of strophanthus in asystole; the effect of rivanol, gentian violet or mercurochrome in endocarditis and in the treatment of pulmonary disease. Blood samples were obtained from the right heart. They stated that in normal individuals the right margin of the x-ray projection shadow was formed by the superior vena cava and not by the ascending portion of the aorta.

Technique.—The technique of cardiac catheterization as now carried out was developed by Cournand and Ranges⁸ at the Bellevue Hospital, New York. The procedure requires a highly trained team. A quiet room is used which contains both fluoroscopic and x-ray equipment. The examination is usually done in

the morning in the fasting state, although it has been performed two hours after meals. The oxygen intake may be estimated by a basal metabolic rate or by breathing into a Tissot spirometer or Douglas bag, over an accurately measured interval timed to coincide with the collection of the venous and the arterial blood.

The operative field is kept sterile. A sufficiently large vein in the ante-cubital fossa of either arm, leading to the brachial, not the cephalic vein system, is chosen. After a local infiltration of novocaine, the vein is exposed. The catheter is of a special flexible radio-opaque ureteral type, No. 8 or No. 9, French, the distal three inches of which has a slight curve for convenience in manipulation. It is made of silk with a smooth varnish finish, and has a hole at the rounded tip. A double lumen catheter has recently been devised by Cournand,⁹ the second hole being 10 cm. from the tip, thus enabling readings to be taken from separate heart chambers simultaneously. The catheter is first connected to a saline reservoir by a three-way stop-cock. A flow of saline is maintained through it, the rate varying from 15 to 60 drops/minute.

The tip is then introduced into the vein and pushed up rapidly to the axilla. All further manipulation is carried out under fluoroscopic control. The curve in the distal end is helpful in correcting false routes which may be taken. Once beyond the jugular vein the tip is seen fluoroscopically to pass without resistance to the right auricle about 1 to 2 cm. above the diaphragmatic shadow. The catheter is rotated so that the tip points medially, which is the optimum auricular position. It may be passed downward from the auricle as the patient takes a deep breath, to the inferior vena cava and thence, if so desired, into either right or left renal vein or into the hepatic veins. To enter the right ventricle from the right auricle, sufficient length is allowed and the tip will move with the blood stream through the tricuspid valve. The catheter should lie easily in the right ventricle and should not be coiled within the chambers or press against the endocardium, especially the septum, since this may cause extra-systoles and some heart consciousness.

By means of the three way stop-cock, the pressure changes in the fluid system of the catheter may be directed to a recording ap-

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paratus, various types of which have been used. These are the simple saline manometer, the Hamilton manometer, or more recently, a strain-gauge type which activates a string galvanometer.^{10, 11, 12, 26, 37, 42} Thus the pressure at the various anatomical locations may be recorded photographically. Special needles are used for entering the femoral artery or a peripheral vein. These may be attached to one of the various manometers for pressure readings. Blood samples are obtained by turning the stop-cock and then withdrawing 5 c.c. of blood to wash back any saline, and then withdrawing 15 c.c. of blood which is collected under oil. Air contamination is strictly avoided. These blood samples are immediately analyzed for oxygen or CO₂. Samples of blood are usually collected from two or three different positions in the vessel or chamber to assure accurate values. Frequent x-ray views are taken in both the antero-posterior and lateral positions so that the exact location of the catheter tip is known, and corrections for venous pressure made if necessary. The presence of the catheter helps to outline the various chambers and orifices of the heart and aids materially in the x-ray diagnosis. This is of the greatest value in studying congenital heart disease. The position of the tip will also indicate whether samples are being collected from such vessels as the coronary sinus, or the azygos vein. It may demonstrate the left auricle and pulmonary vein in cases of auricular septal defect.

Cardiac output.—Cardiac output is measured by the "direct" Fick principle and requires simultaneous samples of mixed venous blood, arterial blood, and expired air. According to the Fick equation the cardiac output is expressed as blood flow in l./min. A more accurate and generally accepted expression is the cardiac index which is blood flow in l./minute/sq. metre body surface.

The mixed venous blood is that taken from the right auricle and, in a large number of cases, has proved satisfactory, providing the tip of the catheter is located close to the tricuspid valve¹⁹ and congenital heart disease does not exist as will be discussed below. Cournand found that auricular and ventricular samples of O₂ varied only 0.26 vol. % in 22 cases, while the CO₂ varied considerably, and concluded that the O₂ content of the auricular sample is truly representative of mixed venous blood.

The average cardiac output as estimated by McMichael and his group²⁷ in England varied from 4 to 8 l./min. with an average of 5.3. The average cardiac index in normal humans as measured by Cournand^{28, 33} was 3.12 l./min./sq.m. body surface. Stead and Warren in estimating the cardiac index found an average value of 3.3. These figures demonstrate that the old figure of cardiac output of 4 litres per minute, as measured by the acetylene method, was too low, a 25% increase probably being more accurate. There was also a correlation between these figures and those obtained by Nickerson, Warren and Brannon⁴¹ in determining outputs by means of the ballistocardiograph.

McMichael observes that this method, *i.e.*, catheterization, only measures output when a steady state of the circulation and metabolism is assumed, and that we are still lacking a method to provide the rate of change of cardiac output from beat to beat. Warren, Stead and Brannon,³⁹ on the other hand, in evaluating the method, feel that the errors involved seem random rather than systematic, but are sufficiently large so that the values in one set of determinations may not represent the actual cardiac output.

Right auricular pressure.—The right auricular pressure was extensively studied by Richards, Cournand and their group.^{20, 33} In common with most observers, they accepted the zero point as being 5 cm. below the angle of Louis on the external anterior chest wall. They point out that the effective auricular pressure is the mean hydrostatic pressure plus the mean negative intrathoracic pressure, the latter of which cannot be conveniently measured during the actual study. They found the right auricular pressure to average 37 mm. H₂O while the gradient from heart to arm was 41 mm. H₂O, with an average peripheral venous pressure of 78 mm. H₂O. Stead and Warren²⁹ found their normal right auricular pressures to range from 0 to 85 with an average of 31 mm. H₂O. Lyons *et al.*¹⁴ recently questioned these positions, and they place their zero point 100 mm. anterior to the skin of the back. Their range of normal venous pressure varied from 50 to 150 mm. H₂O.

Right ventricular pressure.—Bloomfield *et al.* also did an extensive study on the right ventricular pressure.³⁸ It was found, in normal individuals, to average 25 mm. Hg. (337.5 mm. H₂O), with an average pulse pressure of 22.5

mm. Hg. (303.75 mm. H₂O). Most cases of chronic pulmonary disease showed elevated right ventricular systolic and pulse pressures, although some cases of pulmonary emphysema showed no variation from the normal. In addition, these pressures were all raised in primary left heart failure, regardless of the cause.

STUDIES ON CIRCULATION

In studying the application of Starling's law, namely, "Energy of systolic ejection of the heart varies with diastolic filling or diastolic size", McMichael and Sharpey-Schafer³⁴ found a close correlation between cardiac output and right auricular pressures. By the application of pressure cuffs to the thighs in normal subjects, the auricular pressure was lowered and, by means of intravenous infusions, the auricular pressure was raised. The cardiac output varied directly as the pressure in the auricle. These results, however, were not corroborated by Warren and Stead.³² Although the auricular pressure fell on the application of cuffs, the cardiac output did not change in their studies.

It had been shown in 1922 by Drinkwater that storage of blood in the lungs is at the expense of the air spaces.⁶³ The vital capacity decreases in normal man as he changes from the erect to the recumbent position. Presumably the venous return from the abdomen and thorax is increased, thus raising the volume of blood in the lungs, and causing a rise in pulmonary artery pressure. McMichael and Sharpey-Schafer³⁴ have shown an increase in cardiac output in assuming the recumbent position. This increase in venous return may be decreased, and the resulting fall in vital capacity and rise in cardiac output lessened by the application of pressure cuffs on all four limbs, as indicated by Dow⁶⁴ a few years ago. This principle is applied in sudden attacks of pulmonary oedema. Cournand,⁶⁵ in an exhaustive study, concluded that there is no good evidence demonstrating a vasomotor effect on pulmonary circulation, and considered any changes in it purely mechanical.

Circulation in shock.—Both Cournand and Richards have presented an extensive study of the circulation in shock.^{17, 21, 22} They found that cases of severe trauma without clinical manifestations of shock showed a pulse rate, arterial, venous and auricular pressures, blood volume, cardiac output, and peripheral resistance all to be within the range of normal variation. How-

ever, in cases of skeletal trauma and hæmorrhage, exhibiting signs of shock, there is a rapid and precipitate failure of circulation, with inadequate return of blood to the heart. The findings were decreased cardiac output usually, diminished by as much as one-third, low pressure in the right auricle as low as 25 mm. H₂O, a fall in arterial pressure and decreased blood volume with a 35 to 40% reduction.

Richards also studied the peripheral resistance in these cases and concluded that in shock there is a selective vasoconstriction which is compensatory to circulatory fluid loss. It may fail either gradually or suddenly.¹⁸ The smallest additional trauma or physical disturbance may cause disastrous effects. Root, Wolcott and Gregersen,⁶⁶ in studying the effect in dogs of muscle trauma and hæmorrhage, found there was a 10 to 20% decrease in the cardiac output as compared to controls, but a marked rise in the peripheral resistance.

The renal circulation in shock was studied by Cournand^{24, 25} and his group as well. Their method combined cardiac catheterization with renal clearance studies to give results which they consider trustworthy. They concluded that the rate of glomerular filtration and effective plasma flow are reduced in almost every case of shock. The decrease is greater than can be accounted for on reduced arterial pressure alone, suggesting active vasoconstriction in the renal vessels, and that blood is shunted away from the kidney during shock. During emergency treatment, the renal circulation does not improve proportionately to the return of the blood pressure and cardiac output, but rather takes a longer period to recover. In another study during the same year, it was found that albumin therapy²⁶ was effective in producing recovery from shock. Compared with whole blood transfusion, it brought about a relatively larger cardiac output during recovery.

In 1944 Barcroft, McMichael²³ and their group presented their findings in hæmorrhage and in post-hæmorrhagic fainting. During blood letting there was a fall in right auricular pressure and cardiac output. During the faint, however, there was an acute fall in blood pressure which could not be accounted for by the fall in cardiac output and blood volume alone, since these values brought about during the blood-letting were not further altered with the onset of fainting. The authors believe the faint and

fall in blood pressure are due to vasodilatation in the extremities. They support this view by demonstrating an increased blood flow in an extremity during the faint, as indicated by plethysmographic studies. They advance the opinion that the vasodilatation is mediated through the vasomotor nerves.

Circulation in anæmia. — Both Sharpey-Schafer,³⁰ and Stead and his group³¹ studied the circulation in severe anæmia. They both state that there is a compensatory increase in cardiac output at rest. Sharpey-Schafer found an increase in right auricular pressure and a fall in blood volume. He believes the reason transfusions are not well tolerated by these cases is because the transfusion raises the right auricular pressure, thus overloading the heart. Hence, if transfusions are to be given, they must be administered slowly so as to increase the right auricular pressure as little as possible. Stead does not agree with this view. He found the atrial pressure unchanged in the cases which he studied.

Cardiac failure. — An excellent review of congestive heart failure, as studied by catheterization methods, was written by Richards in 1947.⁶⁷ Cournand¹³ found the auricular and venous pressure to be raised in failure, with a disappearance of the normal gradient between them. He also found the right ventricular and pulmonary artery systolic and pulse pressures to be raised in left-sided failure. In cor pulmonale, when there is right-sided cardiac hypertrophy associated with chronic pulmonary disease, the degree of right ventricular pressure rise is not nearly as great as is observed in left heart failure. In common with Cournand and McMichael, he divides fully established cases of congestive failure into two groups. These are: (a) those associated with decrease of cardiac output, such as rheumatic heart disease and arteriosclerotic disease and, (b) those associated with a normal or increased cardiac output even when the congestive state is marked. This latter type is usually associated with some metabolic or mechanical dysfunction such as anæmia, cor pulmonale, thyrotoxicosis or a-v aneurysms. All of these latter conditions have in common an increased demand for oxygen transport.

Cases of circulatory failure due to chronic pulmonary disease have a high auricular pressure and an increased cardiac output according to Howarth, McMichael and Sharpey-Schafer.⁴⁴

The same is true in cases of chronic anæmia. Both types show a fall in cardiac output following digitalization or venesection. Therefore, these authors are of the opinion that therapeutic measures which lower venous pressure are harmful in such conditions. McMichael⁴⁵ summarized his views on circulatory failure in 1946 in an excellent review, as follows:

"The failing heart responds like the overloaded heart in Starling's lung preparation. Mechanical reduction of venous pressure leads to improvement in cardiac function. Digitalis has a primary venous pressure-reducing action which is important in bringing about improvement in cardiac output. In anæmia, emphysema and certain conditions with free arterio-venous communications, the phenomenon of heart failure may appear with high cardiac output. In pericardial tamponade, the rise in venous pressure is compensatory in an effort to maintain an effective filling pressure of the heart."

Stead and Warren⁶⁸ do not agree with these concepts. They state that the level of the right atrial pressure is not an important factor in cardiac output in normal subjects. The atrial pressure in the presence of an adequate blood volume is sufficient to meet wide variations in cardiac output. They believe the cardiac output is under reflex control.

Action of digitalis and aminophyllin. — McMichael and Sharpey-Schafer^{35, 40, 43} made a study of the action of digitalis and aminophyllin. They observed a fall in right auricular pressure in both normals and patients with congestive heart failure following digitalization. However, the cardiac output fell in the normals while it rose in the cases of failure following digitalization. The same changes may be produced by mechanical decrease of venous pressure such as venesection, or by the application of pressure cuffs to the extremities. Because of this similarity of action, they suggest that the action of digitalis is on the peripheral vascular tree rather than on the heart itself, as suggested by Dock⁴⁶ in 1930.

Congenital heart disease. — The widest use of venous catheterization in clinical medicine has been made in the study of congenital heart disease.^{47 to 57, 60, 61, 62} As a result, the surgical treatment of certain forms of congenital heart disease has made tremendous advances, as evidenced by Blalock and Taussig's⁵⁸ operation reported in 1945. It was necessary that practical diagnostic methods be developed and this challenge has been met. Excellent reports have appeared by Bing,^{60, 61} Cournand,⁵³ Stead,⁴⁷ Merrill and Sosman,^{48, 51} Baldwin,⁴⁹ and by Johnson.⁵⁷

Atrial septal defect is indicated by an O_2 content of the right auricular blood being in excess of that of the inferior or superior vena cava. It is evident that blood of a higher oxygen content is being added to the auricle, and presumably this is from the left auricle due to a septal defect. The normal difference between the right auricle and ventricle does not exceed 0.6%, while a difference greater than 2.0% is considered pathognomonic. Usually an increase in the right auricular pressure readings is present. The catheter occasionally may be seen to pass through the defect by fluoroscopic or radiological means and to lie in the left auricle. Pressures of the left auricle and pulmonary vein have been studied by this means by Cournand and his group.⁶⁹ In the same way a ventricular septal defect may be diagnosed by a higher oxygen content in the right ventricle than in the right auricle. Right ventricular hypertension will also be noted by pressure readings. As in auricular septal defects, the catheter may rarely pass through the defect and into the left ventricle. This anomaly is usually associated with pulmonary stenosis as in the tetralogy of Fallot.

An oxygen content substantially higher in the pulmonary artery than in the right ventricle, indicates a patent ductus arteriosus. This must be due to arterial blood entering the artery, most likely through a patent ductus. When the catheter is in the pulmonary artery, care must be taken that its tip is not inserted too far along the artery into one of the smaller branches. If this is done, and the catheter occludes the lumen of a small artery, the blood withdrawn through the orifice in the tip of the catheter really comes from the pulmonary capillaries and veins where the oxygen content is that of arterial blood. This point has been well demonstrated by Dexter,^{55, 59} and it is suggested that it is blood which has flowed in a retrograde manner from the pulmonary capillaries and veins.

In stenosis of the pulmonary artery, the right ventricular pressure is markedly increased. It will be much higher than that in the pulmonary artery itself beyond the stenosis, the degree of which determines whether the tip of the catheter can pass beyond the stenosed area. Normally the systolic peak of these two pressures is almost identical.

The tetralogy of Fallot consists of pulmonary stenosis, intra-ventricular septal defect, overriding or dextro-position of the aorta and right ventricular hypertrophy. These patients are usually cyanotic, since most of the blood is shunted away from the pulmonary circulation into the aorta. The diagnosis may be made as outlined above. In addition, the catheter tip may pass from the ventricle into the overriding aorta. The differential diagnosis between it and Eisenmenger's complex, in which there is no pulmonary stenosis, is important, since operation is not indicated in the latter syndrome.⁶¹ It is pointed out by Dexter⁵² that the differentiation is, however, not clear cut, there being, as he states, "A whole spectrum between the two extremes".

Coronary veins.—The O_2 content of the coronary sinus and middle cardiac vein was studied by Bing *et al.*⁷⁰ They found that the O_2 content of coronary venous blood was lower than that of both right auricular and right ventricular blood. The difference between O_2 contents of peripheral arterial blood (and consequently of coronary arterial blood) and of coronary venous blood varies from 11.3 to 18.7 vols. %, while the systemic A/V O_2 difference varied from 2.8 to 7.3 vols. %.

Hepatic blood flow.—Hepatic blood flow may be studied by hepatic vein catheterization, using urea or bromsulphthalein as test substances. The same calculations as used for cardiac output are followed. Myers,⁷¹ in a recent report, found bromsulphthalein superior to urea in his work. He found the hepatic blood flow to be approximately 19% of the cardiac output measured at the same time. Liver blood flow in pregnancy was studied by Munnell and Taylor⁷² by this means. They found that liver blood flow in normal pregnancy does not differ from liver blood flow in non-pregnant patients with a normal liver. In spite of an increased blood volume in pregnancy, the volume of liver blood does not change, although the percentage of total blood volume does fall.

Renal blood flow.—Patients with chronic congestive failure without evidence of hypertension or renal disease were studied by Merrill⁷³ by means of cardiac output and clearance studies. In advanced cases the cardiac output was half normal, while the renal flow was reduced to one-fifth normal. The filtration

rate was reduced only to half as much as the renal plasma flow, indicating a high intraglomerular pressure. They use these findings to explain œdema formation in failure as being due to "Forward failure" rather than "Backward failure", which is increased hydrostatic pressure in the renal veins. They believe that when cardiac output becomes inadequate, as a result of failure, blood is diverted from the kidney to other parts of the body. There is an efferent arteriolar constriction causing a high intraglomerular pressure. Salt retention is caused by low filtration rate, and not by increased absorption of salt. Thus, they believe the reduction in renal blood flow has no relation to the venous pressure, but rather to the reduction in cardiac output.

Hypertension.—The renin content of the renal venous blood was estimated in normal and hypertensive patients at rest by Haynes, Dexter and Seibel⁷⁵ as well as by Merrill.⁷⁴ There was a raised renin content in eight cases of failure. Merrill implies that there may be a connection between this finding and the fact that cases of low output failures maintain an adequate blood pressure. He would also like to include the low renal flow as evidence of renal vasoconstriction which might presumably be caused by renin. This he states as theory, admitting that no final conclusion can be reached at this time.

Complications.—The complications of venous catheterization were reviewed by Dexter⁵⁴ in 1947. He believes it to be a benign procedure even in fairly ill patients. There are two sources of mild discomfort. The first is venous spasm, which is associated with bodily discomfort. When it does occur it will only be relieved by removing the catheter from the vein for several minutes. The second is ventricular extrasystoles. These may be a source of discomfort and may be demonstrated by the electrocardiogram and by palpitation. The extrasystoles are produced especially when the catheter touches the wall adjacent to the tricuspid valve. They usually disappear when the tip of the catheter is in the ventricle, but occasionally the irregularity persists. It is apparently due to the movement of the catheter with each heartbeat, with consequent stimulation of the region of the tricuspid valve. Dexter reports two patients who developed transient auricular fibrillation which subsided spontaneously in the course of half an hour.

Auscultation and phonocardiography have revealed no demonstrable changes in the heart sounds or production of murmurs as the catheter passes through the tricuspid or pulmonary valve. Cournand, Bloomfield and Lawson,⁹ when recording pressure tracings simultaneously in right auricle and right ventricle, concluded that there was no indication of tricuspid insufficiency as a result of inserting the catheter through the tricuspid valve.

Pathological examination of the endothelium, valve leaflets, chordæ tendinæ and papillary muscles in dogs purposely exposed to traumatic venous catheterization of the right auricle, right ventricle and pulmonary artery has revealed no recognizable pathological lesion resulting from this procedure.³⁶ Post-mortem examination was carried out in ten of Dexter's patients on whom venous catheterization had been performed. In no case was death directly or indirectly attributable to the procedure.

In conclusion it must be stated that the procedure is not without danger, and should be attempted only with due recognition of the potential hazards, and with adequate precaution.

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A NEW PREPARATION FOR SEDATION IN ORGANIC BRAIN DISEASE AND SENILE DISTURBANCES*

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FOR many physicians the concept of pharmacological sedation has become almost synonymous with the use of barbiturates. Numerous different compounds are available, all containing the same radicle. There are the rapidly acting barbiturates, effective for a short time and the slower ones with a prolonged action. It is generally assumed that the rapidly acting barbiturates are destroyed in the liver, while the more slowly acting ones are excreted through the kidneys. Barbituric acid derivatives are convenient and reliable sedatives. Their chief limitations appear when they are prescribed for patients belonging to the older age group. These patients frequently react to barbiturates with mental confusion and increased excitement.

We have found in our experience at the Verdun Protestant Hospital that one of the most reliable preparations for the sedation of senile patients is a combination of scopolamine and apomorphine given parenterally. Small doses of these drugs are usually effective when barbiturates have failed. This combination has also recently been recommended as an adjunct to obstetrical anaesthesia.¹ In an attempt to obtain a medication that would be effective orally, we have combined small doses of phenobarbital and hexobarbital with scopolamine and apomorphine, in order to enhance through synergistic action, the effects of minimal amounts of barbiturates. At the same time the depression of the respiratory centre, which is one of the side effects of the barbiturates, may be antagonized by scopolamine, for this latter drug has been demonstrated to be a stimulant of the medullary respiratory centre.²

In a series of controlled observations we have studied the effects of this combination in 15 patients who required sedation every night for one week. The same patients were then given an equal amount of barbiturates without the scopolamine and apomorphine for another week. In 5 patients no difference was noted in their reaction to either medication. Of the 10 who reacted differently, 9 had better nights

* From the Verdun Protestant Hospital, Montreal.

when scopolamine and apomorphine were added, and I was more disturbed. The difference is statistically significant and tends to confirm the effectiveness of small oral doses of scopolamine and apomorphine in combination with barbiturates.

The combination of the ultra-short acting hexobarbital with the more slowly acting phenobarbital was adopted in order to obtain a comparatively rapid effect which would not be exhausted in too short a time. The burden of elimination of the two compounds is divided between the liver and kidneys.

We have occasionally seen elderly patients whose excitement at night would subside following oral administration of nicotinic acid. This empirical finding as well as theoretical considerations have led us to add nicotinic acid to our sedative combination. It has been shown that nicotinic acid, which is a powerful non-toxic vaso-dilator, increases the blood flow to the brain.³ It is also an essential co-enzyme of cerebral cell metabolism. There is some evidence to suggest that cerebral circulation and metabolism are impaired in states of mental confusion. It was therefore reasoned that nicotinic acid which is of therapeutic value in confusional states⁴ might counteract the confusion associated with the use of barbiturates in certain cases.

We have experimented with 4 different formulæ. The final formula which has been prepared for us by a manufacturing firm* consists of: scopolamine, gr. 1/200; apomorphine, gr. 1/70; phenobarbital, gr. 3/8; hexobarbital, gr. 3/4; nicotinic acid, gr. 3/4. The tablets are scored so that they can easily be divided. The ordinary hypnotic dose is one or two tablets, while half a tablet may be used as a day sedative.

We have given about 2,000 of these tablets during the past three months and have made the following observations:

The formula is usually effective in from 25 to 35 minutes. In most cases it does not produce a sensation of being drugged, but rather a feeling of sleepiness and relaxation that resembles normal fatigue. The hypnotic effect lasts for about 6 hours and we have convinced ourselves

that there is less of a "hangover" than with most of the plain barbiturates, even the short acting ones. It has been our impression that in senile patients this preparation produces less confusion than most other sedatives.

In a number of cases the formula has been administered daily for a period of weeks or months without untoward effects. In a few extremely agitated psychotics as many as 12 tablets per day have been given for several days. With the ordinary dosage of 2 to 4 tablets in 24 hours neither dryness of the mucous membranes, nor dilation of the pupils, nor increase of the pulse rate due to scopolamine has been observed. It is interesting to note that not many patients have shown the flushing of the face which frequently follows the administration of larger doses of nicotinic acid. However, in the case of accidental or deliberate over-dosage, marked flushing of the face would probably serve as a telltale sign. Nausea or vomiting was never observed, probably because the dose of apomorphine used in the combination is much too small to produce an emetic effect.

On the basis of pharmacological considerations and clinical observations this sedative combination seems to have well-defined advantages, not only in all senile patients but also in other cases where temporary or permanent organic impairment of cerebral function is present. We have found it useful in patients with general paresis, alcoholic delirium, and in states of persistent confusional excitement following head injury. Finally we have given it to a number of psychotic and psychoneurotic patients in whom no organic brain damage was present, but where for some reason or other it seemed advisable to reduce the amount of barbiturates required for sedation during the day or the hypnotic effect at night.

While preparations containing a combination of several synergistic drugs are commonly used in various medications, for instance in analgesic preparations, there are comparatively few combinations of sedative drugs employed. It is to be noted that the addition of nicotinic acid introduces a therapeutic action beyond the mere symptomatic sedation or hypnotic effect. Two tablets of the formula as given contain 90 mgm. of nicotinic acid, an amount which is frequently prescribed for its metabolic and vaso-dilator action in patients

*This preparation will be produced under the name of Somnol, by Frank W. Horner, Ltd., to whom we are indebted for supplying us with Somnol tablets for this work.

suffering from nutritional deficiencies or cerebral arteriosclerosis.

The writer wishes to thank Dr. George E. Reed, Medical Superintendent, who has given permission to publish this work.

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RÉSUMÉ

Les barbituriques sont d'excellents sédatifs, mais ils peuvent avoir l'inconvénient, surtout chez les personnes âgées, de produire un état de confusion ou d'agitation. Pour calmer des malades souffrant de psychoses organiques ou séniles, l'auteur a associé aux barbituriques la scopolamine et l'apomorphine. La première a l'effet de protéger le bulbe contre la dépression qu'amènent les barbituriques; quant à l'apomorphine, son action sédative propre permet de diminuer la dose de barbiturique. L'auteur a donné également de l'acide nicotinique, qui a paru obvier, en partie du moins, à l'action confusionnelle des barbituriques. Il semble que l'acide nicotinique agisse en déterminant une vaso-dilatation cérébrale. Une préparation sédative composée des agents énumérés ci-haut possède une action hypnotique d'une durée de six heures, et produit peu de symptômes désagréables au réveil.

PAUL DE BELLEFEUILLE

THE XENOPUS PREGNANCY TEST*

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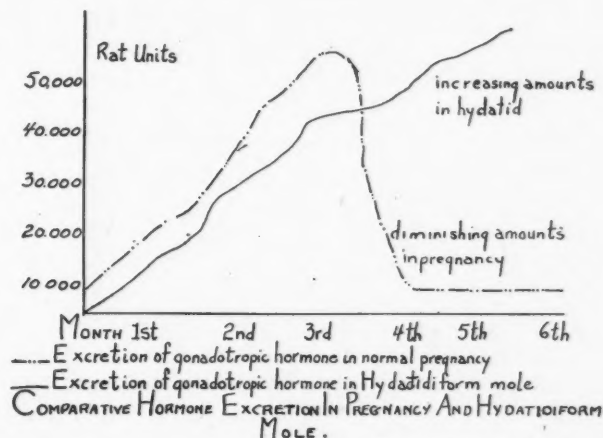
DIAGNOSTIC tests for early pregnancy have been receiving world-wide study, and medical journals have contained descriptions of many tests. The claims of some authors have been at times nothing short of miraculous. These enthusiastic reports have led the average physician to try some of the tests, with frequently embarrassing results.

The accepted tests in general use depend on the presence of gonadotropic hormone in the urine. This hormone is produced by the chorionic villi and under certain conditions causes artificial ovulation in the test animals.

In human pregnancy, the gonadotropic hormone can be demonstrated in the blood serum and passes through the kidneys. The concentration in the urine is similar to that in the blood serum. This hormone rapidly attains its peak and declines during the first trimester of preg-

nancy as shown on the accompanying graph. This increased concentration in blood and urine is the basis of the *Xenopus* or frog test for early pregnancy. After the third month, a pregnancy can usually be diagnosed by x-ray examination.

Two tests for the determination of early pregnancy are in general use, the Ascheim-Zondek (mouse) test and the Friedman (rabbit) test. Both of these tests have a reported accuracy of 98 to 99%, but the time element of one and a half to four days is a disadvantage when a quick report is necessary in an emergency diagnosis of early pregnancy. These tests are available at a distance of three hundred miles from Sudbury, Ont., and reports are usually received in from seven to ten days after mailing the urine sample, and frequently, a repeat test is requested. Other disadvantages are the space, cost, care and odour which would be involved in obtaining and keeping the required number of mice and rabbits.



The *Xenopus* test for pregnancy was first exhibited in the United States in 1939, at a meeting on endocrinology sponsored by the New York Academy of Medicine, but only limited shipments of the frogs from South Africa were available in the United States during the war. In the fall of 1946, Mr. George Adams, Director of the Langner Laboratory of Philadelphia, and Mr. Christopher W. Coates, Aquarest, New York Zoological Society, were visited and detailed instructions obtained on the care and use of these frogs. The Langner Laboratory had substituted the frogs for mice and rabbits previously used. Several hundred frogs can be kept in a small area of a furnace room where the temperature of the water is maintained at about 70° F. There is no odour, very little care is needed and the cost of feeding is much less.

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The frogs we are using are from South Africa and are tested for fertility by the distributors in Baltimore and New York before being sent to us. The *Xenopus Laevis* bred and raised in America will not give tests of the same degree of accuracy. Our first shipment of 25 frogs (females) arrived in November, 1946, and were joined by 75 more within a year.

The chief characteristics of these frogs are as follows: they are purely aquatic, have clawed toes, are tongueless, have no teeth, are entirely carnivorous and feed only in water. *Xenopus* are easy to feed in captivity. They are fed minced lean beef, beef heart and occasionally liver and fish. Cod liver oil and vitamin B are added every few weeks. They are kept in aquariums and the water is changed before and twenty-four hours after each feeding. The water temperature should be 70° F. It is important that the fresh water should be of the same temperature as the old, or they may suffer from temperature shock. Frogs used for tests are not fed for twenty-four hours or they may vomit and inhale particles of food.

PHYSIOLOGICAL BASIS OF THE PREGNANCY TEST

The *Xenopus* frog has very large ovaries which occupy the greater part of its abdomen, and eggs are present in them during the entire year or at all times. Eggs are never extruded except through stimulation of the male during the mating season, or by injection of hormones. The test is based on the extrusion of ova or eggs from two to twelve hours after the injection of urine concentrates containing gonadotropic hormone into a female *Xenopus*. Ova are usually deposited in hundreds or thousands, but no matter how few, even a half dozen, it is indicative of a pregnancy. If eggs are deposited, the patient is pregnant; if no eggs are extruded, the test is negative. The negative test frogs can be used again after a rest period of seven days and the positive after thirty days.

Low egg-counts may be obtained due to small amounts of hormone in normal pregnancy; in very early pregnancy (less than ten days after a skipped menses); incomplete, threatened and missed abortion; in ectopic pregnancies; and in too frequent use or poor health of the frogs. Negative tests are usually obtained after the fourth month of normal pregnancy when the gonadotropic concentration has decreased as indicated in the graph.

The following mimeographed sheet is given each patient submitting a urine specimen for the pregnancy test:

1. A positive *Xenopus* or frog test for pregnancy has been obtained four days past an expected menstrual period, but for practical purposes, it is advisable to postpone the test until ten to twelve days past the time of the expected menstrual period.
2. All drugs, even aspirin, (and hypodermics) should be avoided for at least two days prior to the test.
3. Salt, spices and foods high in protein should be limited during the evening meal before the test.
4. Drink no liquid or water after 4 p.m. and pass your urine before retiring. Collect a specimen about 8 a.m. (before breakfast) the next morning and bring in at least three ounces.
5. The sample should be identified by placing your name on the label.
6. Give date of the last menstrual period.

During the first few weeks of pregnancy, there may be a low concentration of gonadotropic hormone and in order to maintain a high degree of accuracy, we concentrate or precipitate the gonadotropic hormones of all urine specimens. From about 30 to 60 days after the expected or missed menstruation, when the gonadotropic hormone concentration is high, a positive test can be obtained by injecting whole urine.

Some drugs may be precipitated in the urine concentrate in sufficient amounts to cause severe toxic reaction or death of the test animals. We have lost eight frogs in 350 tests. This was traced to patients who did not follow these instructions to discontinue drugs for 48 hours before submitting urine specimens; and in several urgent cases where we disregarded the rule, we lost one or both frogs.

The following report is on our first 350 tests on our own patients and those of our confrères in Sudbury. All reports have been subsequently checked for accuracy and found to be correct. Our practice is to repeat all negative tests within two weeks where deemed necessary. There have been 144 positive tests with 100% accuracy; 206 tests were negative. Seventeen urine specimens submitted from four to twelve days after the expected menstrual period gave correct positive tests. Twelve specimens submitted within twelve days gave initial negative tests. These were repeated in one week and gave correct positive tests. Two of the positive tests were suspected ectopic pregnancies, later confirmed at operation. Three positive tests later became negative, a missed abortion was diagnosed and confirmed at operation.

The differential diagnosis between pregnancy and other gynaecological conditions such as amenorrhœa, uterine enlargement, lower abdominal masses, pseudocyesis, etc., may be quite difficult at times, and a reliable pregnancy test may be of considerable assistance.

In a missed abortion, a positive test becomes negative as the chorionic villi become inactive. This usually occurs shortly after the death of the fetus, but occasionally a portion of placental tissue may remain attached to the uterus and living for several months.

Urine from patients with endocrine disfunctions such as pituitary, cortical renal tumours, some ovarian tumours, persistent luteal cysts, may produce both a positive test in the rabbit and frog. Fortunately, these are rare.

An increased amount of follicle-stimulating hormone is found in normal menopause urine, but to date, no *Xenopus* has given a positive reaction to "menopause" urine. Eight of our series presented this problem.

The urine from a patient receiving hormone injections has been reported to give a positive reaction. All such injections should be discontinued for a few days prior to submitting a test in order to avoid a false positive reaction.

The *Xenopus* test may be of assistance in the diagnosis of hydatidiform mole and chorio-epithelioma. The greatest gonadotropic hormone output of normal pregnancy is during the first three months. After three and one-half months when the placenta takes over the function of the corpus luteum, there is a marked drop in the gonadotropic hormone of normal pregnancy urine, while in chorionic tumours it reaches its highest peak.

It is after the fourth month of amenorrhœa that a hormone differential diagnosis may be of value in differentiating between a normal pregnancy and one of tumours of the chorion.

SUMMARY

1. Results from the *Xenopus* pregnancy test are obtained quickly in from two to twelve hours, average, eight hours.

2. It is accurate—98% plus.

3. Results are obtained by observation of eggs in water.

4. The test is simple and a single injection is sufficient.

5. The frogs are easily and inexpensively maintained.

6. The test is inexpensive as the animals can be used repeatedly.

I wish to express my appreciation to Mrs. George Fleming, R.N., a member of the Clinic Staff, for her keen interest in this phase of our laboratory work, and in keeping and compiling the results. Credit must also be given to the Sisters of St. Joseph's Hospital, Sudbury, Ontario, and my confrères in Sudbury for their co-operation in sending urine specimens.

Since writing this article, the number of tests has increased to 530, with the same degree of accuracy.

OSTEOARTHRITIS OF THE HIP

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"Hypertrophic arthritis remains the neglected step-child in the family of rheumatism."—Hench (1937).

OSTEOARTHRITIS of the hip is the most disabling form of osteoarthritis and much has been written concerning its etiology. The host of causes to which it has been ascribed may be conveniently divided under the headings: infection, fracture, dislocation, rheumatoid arthritis, osteochondritis, Paget's disease, certain congenital defects, and unknown. Plewes¹ considers the following in their given order to be the most frequent causes of osteoarthritis of the hip: (1) trauma; (2) adolescent slipped epiphysis; (3) coxa plana; (4) protrusio acetabuli. Magnuson² writes of his experiments with dogs: "We were able to produce the typical picture of degenerative arthritis in only one way—and that was by allowing the animal to subject the joint to often-repeated slight trauma". (This was done by cutting the medial and cruciate ligaments of the knee and allowing the animal free range of exercise.) Some authors consider local interference with the blood supply of primary importance, and mention the fact that on opening an osteoarthritic hip, the ligamentum teres is frequently found to be nothing but a fibrous cord. This would seem to explain cases in which there is injury to a hip, insufficient to cause fracture, where osteoarthritis supervenes at a later date, the supposition being that there has been damage to the vessels of the ligamentum teres. In this connection it is interesting to read Magnuson's statement that almost invariably the cartilage of the head is more roughened and degenerated than that of the acetabulum.

Gilmour³ writing on protrusio acetabuli describes "a protective fluid mechanism which plays an important part in weight transmission and in joint economy". According to this concept the operation of the fluid mechanism is impaired when a deep acetabulum is present, with the resultant early onset of osteoarthritis. The significance of the upright position is discussed in an interesting paper by Abercrombie:⁴ "In man the whole onus of weight-bearing and locomotion falls on the lower limbs and consequently on the hip joints. Hypertrophic changes, osteophytes and osteoarthritis provide the evidence of the instability of a recent adaptation and may be regarded as Nature's efforts to buttress up structures which are unequal to the strains to which they are subjected."

The high incidence of osteoarthritis in the older age groups inspired the theory that this disease represented an "aging" process, occurring as the combined result of age, trauma and senescence of tissues. Undoubtedly these are predisposing and precipitating factors, but we are inclined to say with Hensch: "One is not completely satisfied to regard them as the chief etiologic agents".

Pathology.—The pathological changes seen in osteoarthritis of the hip have been exhaustively described in excellent papers by Harmon,³ Magnuson,² Sawyer and Ghormley.⁶ The earliest change appears to be central surface roughening of the articular cartilages, more pronounced on the head of the femur than in the acetabulum. At this stage one can debride the roughened areas and expose apparently normal cartilage beneath. In later cases the cartilage becomes pitted and ridged, eventually wearing through and exposing the underlying bone, which soon becomes eburnated. Peripherally, where presumably the cartilage is better nourished, there is hypertrophic proliferation and the excrescences so formed become ossified—the so-called osteophytes. The head of the femur itself increases in size both by sub-chondral sclerosis and osteophytic proliferation. A large exostosis is commonly found on the anterior and superior portion of the femoral neck; another, the adductor osteophyte, is found on the medial and inferior portion of the head.

Paul Magnuson describes a second type of cartilage degeneration which apparently starts

at the matrix and works outward, and is characterized by fissures, loose and mottled cartilage, lying beneath normal hyaline cartilage.

The joint capsule also undergoes change, viz: "Free joint fluid, loose osteo-chondral bodies and thickened joint capsule with hypertrophic red-blue synovia are the usual findings when these joints are opened surgically". (Paul Harmon). And again: "The synovial membrane is invaded by fibrous tissue with markedly increased vascularity" (Sawyer and Ghormley).

Symptomatology.—The two cardinal symptoms of osteoarthritis of the hip are pain and limitation of movement, characteristically aggravated by activity and relieved by rest. The symptoms are frequently disproportional to the amount of actual damage present, in fact Plewes, in a series of some 240 cases, found 20 patients with no complaint of pain whatsoever. At the onset there is usually a mild ache with some stiffness, coming on after prolonged exercise; later, progressively less exertion is found to bring a similar result, and as the pain increases so does the inability to use the leg properly. There is increasing difficulty in tying the shoe, and a tendency is discovered for the leg to continually turn outward while walking. Eventually there is greatly decreased movement in the hip joint and pain on weight-bearing may be constant. With a history of preceding accident (insufficient to cause fracture), one often finds that the pain has been continuous since the time of injury. The pain predominates in two sites, over the anterior surface of the joint and immediately above the great trochanter on the lateral aspect of the thigh. Pain at the lateral side of the knee may be the only complaint.

Several of our patients were found to have received extensive local treatment for pain in the knee. On examination, a previously unrecognized osteoarthritis of the hip was discovered to be present.

Laboratory tests.—Almost invariably the sedimentation rate is within the normal range. Occasionally slightly higher values occur but then one must remember the non-specificity of this test. There is usually no anaemia, the white count and differential count are normal.

X-ray of the hip shows, in early cases, narrowing of the cartilage, with diminution of joint space in the weight-bearing axis, in contradistinction to rheumatoid or infective arthritis,

where often a uniform and regular thinning is seen. In later cases there may be complete loss of joint space, with or without deepening of the acetabulum and coincidental lateral dislocation of the head of the femur. The head itself is broadened and mushroomed in appearance, and may contain cysts. Exostoses are present in 95% of cases, and appear around the acetabular rim, the head, and along the neck of the femur. In advanced cases, the adductor osteophyte may be half as large as the head itself, often causing partial dislocation. The osteophytes and exostoses regularly seen at the operating table can-

of trauma, at times a history of infection immediately preceding the onset of symptoms, and pain in the knee may be the only presenting complaint.

On examination, some limitation of movement will usually be found particularly in adduction and internal rotation. In late cases the limb may be externally rotated and there may be a fixed flexion deformity with greatly reduced movement at the hip. Tenderness is frequently present on the lateral side of the thigh just above the great trochanter. There may be tenderness or pain along the adductor

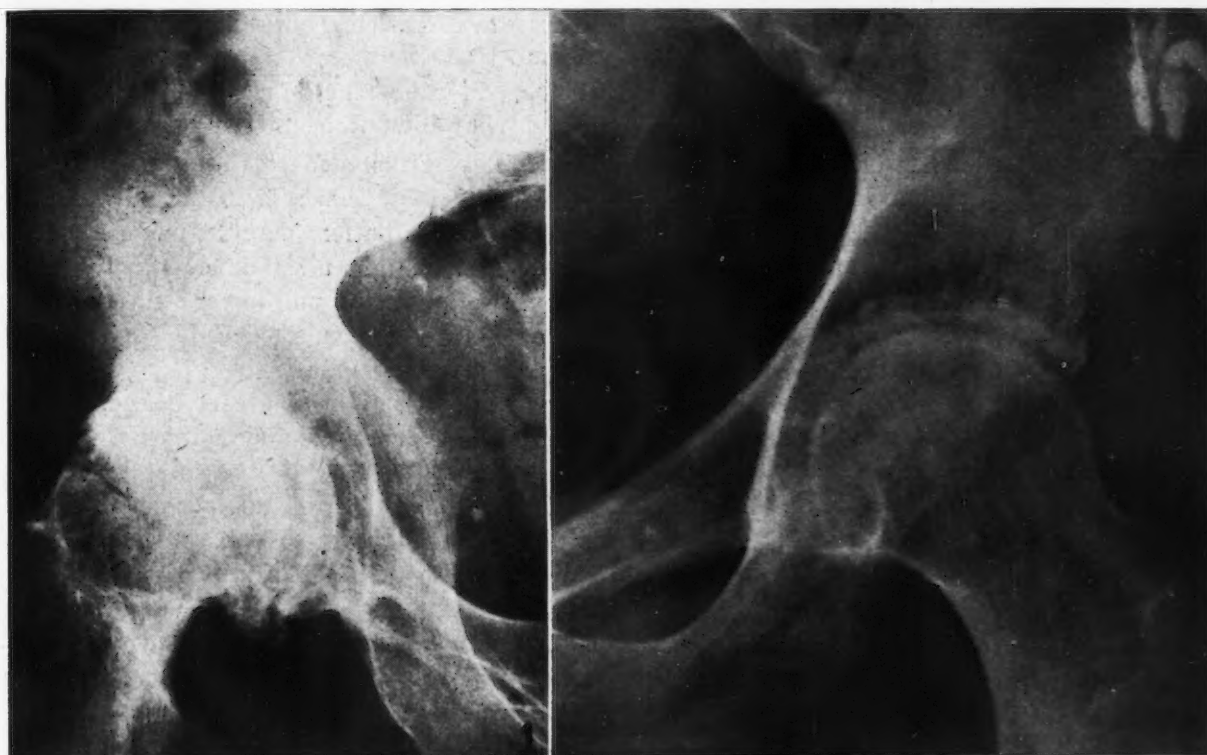


Fig. 1.—Osteoarthritis of the hip. Note loss of joint space in the weight-bearing axis. The space at the medial side of the joint is practically normal in depth.

Fig. 2.—Rheumatoid arthritis of the hip. Here there is a *uniform* loss of joint space between the femoral head and the acetabulum. (The opaque material in the upper outer part of the film is intramuscular gold.)

not however be properly appreciated by the usual roentgenograms.

The neck may be broadened and in a varying degree of valgus. The femur may be externally rotated, as evidenced by the lack of prominence of the lesser trochanter in the antero-posterior view.

Diagnosis.—A history of pain in the hip, insidious in onset, relieved by rest and aggravated by use, with gradually increasing disability in an otherwise healthy, middle-aged male, strongly suggests a diagnosis of osteoarthritis of the hip. There is often a history

group of muscles and also over the anterior aspect of the hip joint. Shortening of the limb may or may not be present depending on the stage of the disease.

The sedimentation rate is within normal limits, anæmia is not usual, the x-ray in early cases shows narrowing of the cartilage plate in the weight-bearing axis; in late cases complete loss of joint space, sub-chondral sclerosis and varying degrees of distortion and displacement of the femoral head.

Differential.—We must consider rheumatoid arthritis, infective arthritis, tuberculosis, ma-

lignant bone disease, sacro-iliac disease, meralgia paræsthetica and fibrositis in the differential diagnosis. Rheumatoid arthritis shows radiological changes and deformity in the hands, anæmia, increased sedimentation rate and multiple joint involvement, in contrast to osteoarthritis where anæmia is not a feature, there is usually mono- or bi-articular involvement and the sedimentation rate is normal. The differential x-ray picture has been mentioned previously.

Tuberculosis frequently has associated symptoms such as chronic cough, hæmoptysis, night sweats, loss of weight, night pains, etc. However, early tubercular disease must be kept in mind as it may occur with minimal findings. Aspiration of the joint and guinea pig inoculation in doubtful cases, is of great help. Primary malignant disease of the hip is unusual and occurs with an elevated sedimentation rate. Evidence of new growth elsewhere and x-ray showing bone destruction in other sites aids in diagnosis. Meralgia paræsthetica gives pain along the lateral side of the thigh which may convince the patient he has hip disease. Usually a tender "trigger" area is found, pressure upon which will reproduce the pain. Similarly, fibrositic nodules in the lower back and around the hip, can produce symptoms in this area.

In infective arthritis there is often a preceding history of infection, gonorrhœal or other—as in one of our cases which began abruptly following a severe cellulitis of the face. X-ray will often reveal sacro-iliac disease, or the first sign of ankylosing spondylitis. Other tests such as compression of the iliac crests or pain on twisting one ilium against the other prove the discomfort to originate in the joints.

Pain not relieved by rest in bed and the ordinary analgesics would lead one to believe that he was not dealing with an ordinary case of osteoarthritis.

TREATMENT

Of primary importance in the treatment of osteoarthritis is the reassurance to the patient that he will not progress to a stage of helpless invalidism as may occur in rheumatoid arthritis. The patient is placed in a bed containing a fracture board (to prevent sagging) and is at first allowed only bathroom privileges. If

overweight a diet is ordered and any tendency to constipation corrected. As a routine, a multivitamin preparation is prescribed, some form of sedation is given and any obvious focus of infection is attended to.

Daily a trained attendant (preferably male), puts the hip through all its movements—internal and external rotation, abduction, adduction and extension, to the fullest extent possible without forcing. This, besides keeping the joint "open", stretches contracted periarticular structures and to a degree, gradually increases range of motion. At the same time the patient is instructed in quadriceps and other muscle building exercises. A Balkan frame erected over the bed can be used to suspend rubber ankle slings for the pendulum type of abduction, and adduction exercises.

A pulley is fastened to the end of the bed and by means of this a 15 to 25 lb. weight is attached to the patient's ankle, using a canvas sling. (The weight must be enough to give a definite sensation of pulling or "drawing" in the groin.) Traction applied in this way for 20 to 30 minutes three times a day is an additional way to stretch contracted and scarred periarticular structures and maintain increased movement. This may be increased to several hours daily as tolerated. The deep pool bath is a very useful part of our armamentarium. Here, with heat relieving the muscle spasm, and the effect of gravity lessened, stiff joints can be moved through a range of movement and with an ease invariably surprising to the patient. These baths are taken daily.

Manipulation is valuable and may be done early or late. There are certain advantages to doing it early; a more exact idea of the limits of joint movement is obtained with the patient under anæsthesia; quick results increase the patient's confidence and stimulate more whole-hearted co-operation in subsequent treatment. Manipulation is carried out under pentothal anæsthesia after the method described by Timbrell Fisher.⁷ Very often adhesions may be felt or heard to snap or give, however, a cautious stretching of the joint structures is more to be desired, and not too much should be attempted at any one time. Some 20 to 25% improved movement can commonly be achieved by this form of treatment.

It should be remembered that in advanced or long-standing cases, mechanical obstruction

is usually present, because of osteophyte formation, deepening of the acetabulum, etc., and the manipulation mentioned above is designed only to increase joint movement up to the point of bony block and no more. However this alone can make a great difference in the patient's ability to get around, do up his own shoes, etc. As might be expected, those with marked deformity of the femoral head derive the least benefit.

After-treatment is of great importance. A routine is established whereby the joint is daily put through its full range of movement. End-of-the-bed traction and deep pool baths are started at once, while flexion deformity of the hip, so commonly present is combated by instructing the patient in a method of hyper-extension—leaning back against the side of the bed and allowing the feet to dangle. Once a week or oftener the hip capsule is injected with 20 c.c. of 1/2% procaine, as described by Fletcher,⁸ using a Luer-Lok syringe so that this may be done under pressure. This relieves the pain and allows a greater range of movement during the routine manipulation which follows. Sciatic pain that is present may also be relieved by procaine directly into the nerve. Any areas of fibrositis are similarly injected. Infiltration of tense adductor muscles is useful in selected cases to diminish muscle spasm.

On discharge from hospital, the patient is instructed to set up a traction apparatus for himself when he goes home, and to put his hip through a full range of movement daily. He is advised to wear rubber heels (to minimize jarring), keep his weight within normal limits, and to walk erect. Unnecessary exposure is to be avoided and he should dress warmly. A daily rest period is advocated, preferably both morning and afternoon, as well as some daily exercise. If discomfort or stiffness of more than an hour's duration follows the exercise, it should be reduced.

SUMMARY

A discussion of osteoarthritis of the hip has been presented, together with an outline of modern-day management. It is surprising what can be accomplished by simple methods and how much help can be given to this type of patient without the necessity of recommending a major operative procedure and its frequently doubtful benefits.

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CASE REPORTS

COMPLETE DUPLICATION OF THE LARGE BOWEL TREATED BY SUBTOTAL COLECTOMY*

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Complete duplications of the large bowel are exceedingly rare. One case of triplication has been recorded.¹ Ombredanne,² Bar,³ Aitkin,⁴ and Griess⁵ have reported cases of complete duplication. The duplication reported in this

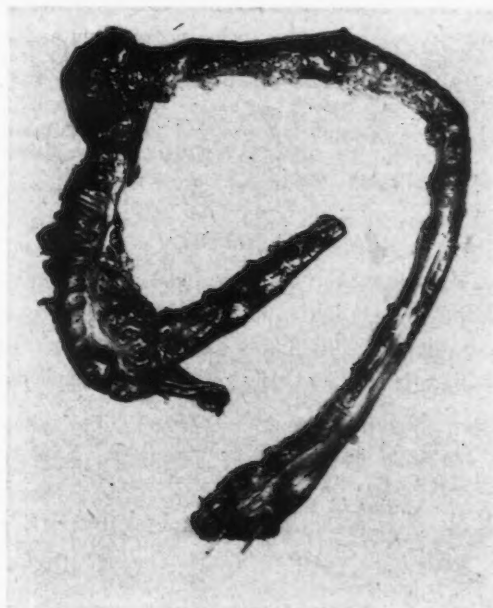


Fig. 1

paper resembles that of Aitkin in that the terminal ileum was also double (Figs. 1 and 2) and demonstrates that the duplication may involve both ileum and colon.

A.M., male, aged 4½ years. Admitted to the Children's Memorial Hospital on October 16, 1947.

Chief complaints for the four months prior to admission were the passage of faecal contents and gas

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per urethram, frequency and dysuria, and painful bowel movements. Since birth the child has experienced alternating periods of constipation and frequent bowel movements. When constipated the abdomen became enlarged. The symptoms of recto-urinary fistula for four months prior to admission were the precipitating cause of hospital admission.

On physical examination the abdomen was protuberant and there was a mild degree of diastasis recti. On rectal examination a mass could be felt about the size of a

When the colostomy was opened forty-eight hours later, the colon was found to contain a double lumen at this site. This was the first indication that a duplication of the colon was present. Subsequent cystoscopy demonstrated the urinary fistula to be between the posterior urethra and rectum.

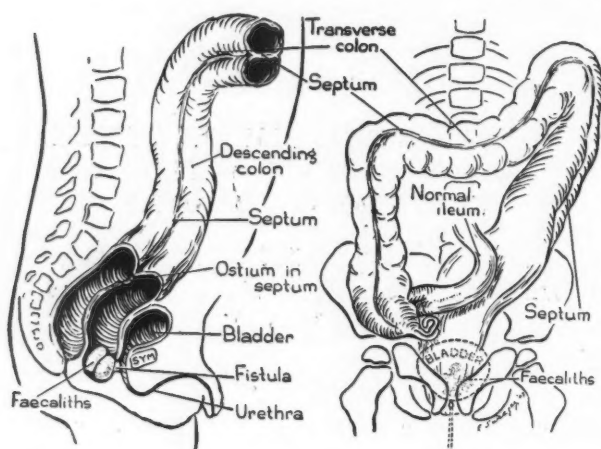


Fig. 2

lemon one inch within the anal orifice and anterior to the rectum. Within the mass small moveable "stones" were felt to click together on palpation. It was thought that these were bladder calculi and a flat plate of the abdomen appeared to support this contention. However, they later proved to be faecaliths in the blind end of the duplication. The urine contained frank faecal contents and indicated that there was a fistula between the urinary tract and the bowel.

Cystoscopic examination revealed gross faecal contents in the bladder and the examination was unsatisfactory in localizing the exact location of the fistula.

TREATMENT

The first operative procedure was to perform a transverse colostomy by the Wangenstein method (Fig. 3, No. 1) as a preliminary to localization and treatment of the recto-urinary fistula.

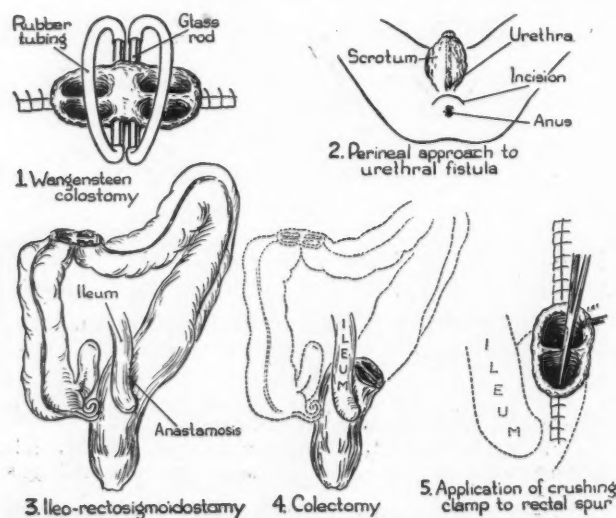


Fig. 3

A perineal approach to the recto-urethral fistula was made (Fig. 3, No. 2) and the small fistulous tract was successfully divided and turned in at each end. At this time several firm faecaliths were removed from the termination of the duplicated colon. These had been previously palpated through the rectum and thought to be bladder calculi. Two weeks following this procedure, the catheter was removed from the urethra and there was no recurrence of the fistula.

Four weeks later a laparotomy (Fig. 3, No. 3) was done through a left paramedian incision and a careful abdominal exploration was made. The entire colon, together with five inches of terminal ileum, appeared to be duplicated to within one inch of the anal canal. There were two appendices. Whether this duplication was continuous or segmental could not be ascertained at this time. A rectal tube was introduced through the anus to establish which colonic lumen communicated with the anal canal. Then the terminal ileum was anastomosed to this lumen at the recto-sigmoid junction.

Two weeks following this operation a subtotal colectomy was carried out, removing the duplicated terminal ileum and the entire colon as far as the recto-sigmoid, about one inch above the previous ileorectosigmoidostomy (Fig. 3, No. 4). In order to preserve a rectum the double-barrelled stump of recto-sigmoid was brought out to the skin surface and a crushing clamp applied to the spur to convert the remaining duplication of the rectum into one chamber, similar to the method of breaking down a Mickulicz colostomy spur. After the spur was completely crushed by three applications of the clamp to the septum (Fig. 3, No. 5), the colostomy was closed and the abdominal wall sutured.

The patient was discharged twelve days after the last operation on March 18, 1948, at which time he was having one to two soft formed stools daily.

COMMENT

Until the operative specimen was removed, it was impossible to determine the exact extent of the duplication and whether or not there were blind segments along its course. The presence and number of communications between the duplication and colon was not known. Barium examinations were inconclusive in answering these questions and it was for these reasons that it was thought wise to perform a subtotal colectomy.

On examining the operative specimen, the duplication was found to be complete, as shown in Figs. 2 and 3. A small orifice connecting the two lumens was demonstrated in the rectosigmoid, just above the point of resection. This was the only communication between the two colons and meant that the duplication below this ostium was a blind pouch in which gastro-intestinal contents accumulated, resulting in the formation of faecaliths (Fig. 2). The faecaliths which were removed from this reservoir were of a stony hard consistency and the nuclei of two of them proved to be plum stones. Since the symptoms of urethral fistula were present for only five months prior to admission, it is possible that this fistula may have been caused by ulceration of one of these stones into the posterior urethra.

The walls of the two colons were intimately blended and the picture was that of a median septum in a large colon, rather than two distinct colons (Fig. 3). All layers were complete, both in the duplication and in the normal bowel. The blood supply was a common one, which is the usual arrangement,⁶ and any attempt to separate the two parts would have been impossible. Until a rectal tube was introduced beyond the blind end of the duplication, it was impossible to tell which was the duplicated portion and which proceeded to the normal anal orifice.

The problem of preserving a rectum and, at the same time, eliminating the duplication, was difficult, but was solved by the repeated application of a crushing clamp to the rectal septum.

SUMMARY

1. A case of complete duplication of the colon with urethral fistula is described.

2. The method of treatment by subtotal colectomy with preservation of the rectum is described and illustrated.

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CRUVEILHIER-BAUMGARTEN SYNDROME*

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In 1833, Pegot reported a case of portal hypertension in which a loud venous hum was heard at the umbilicus. This case was elaborated by Cruveilhier. At autopsy, it was found that the venous murmur was due to collateral circulation through a widely patent umbilical vein. The liver was hypoplastic. In 1908, Baumgarten reported a similar case in a sixteen year old boy who died following a gastric hæmorrhage. He believed that the widely patent umbilical vein, splenomegaly, and atrophic liver were due to congenital hypoplasia of the liver. Since then, several similar cases have been reported in the foreign literature, but the first complete review in the English literature was that by Armstrong *et al.*¹ in 1942.

The term "Cruveilhier-Baumgarten syndrome" is used for cases of portal hypertension, due to any cause, in which a loud venous murmur can be heard over the upper abdomen. The term "Cruveilhier-Baumgarten disease" is reserved for cases with congenital patency of the umbilical vein associated with congenital hypoplasia of the liver and portal system, and a venous murmur over the umbilical vein.

The following is the summary of a case which we believe can be classified as Cruveilhier-Baumgarten's syndrome.

Patient (H.T.) first became known to this hospital in October, 1941, when he was operated on for a strangulated right femoral hernia. At that time, the Wassermann and Kahn tests were strongly positive.

On August 24, 1943, he was re-admitted complaining of sharp pain in the right upper quadrant for three

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weeks, and jaundice for one week. A laparotomy revealed "a mass, regarded as malignant, involving the falciform ligament and extending into the porta hepatis. The right lobe of the liver was thought to be full of metastases. There were a large number of enlarged glands in and about the common duct. No primary focus could be found." He was discharged ambulatory on September 16, 1943.

He was then seen at intervals in the out-patient department. In July, 1947, he returned complaining of weakness. Because of the positive Wassermann and Kahn, he was given a course of 15 injections of bismuth, followed by 6,000,000 units of penicillin. This was completed on February 4, 1948.

On February 16, he was re-admitted, complaining of recurrent fainting attacks in the preceding two weeks. He had been eating poorly, was incontinent of urine, and had been confused and incoherent.

On physical examination, the patient appeared older than his stated age of 52 years and showed evidence of only slight weight loss. His features were pinched and there were dilated venules over his nose and cheeks. His sclerae and skin revealed very mild icterus. Eyes, ears, nose, and throat were essentially normal. There was no lymphadenopathy. The lungs were clear. Pulse 76, regular. Blood pressure 130/80. There were no murmurs and no cardiac enlargement.

The abdomen was distended and flanks bulging. The scars of previous operations were noted. Shifting dullness and a fluid wave were demonstrated. There were several prominent superficial veins coursing away from the umbilicus. Liver dullness was decreased. The spleen was firm and the tip was felt 5 cm. below the left costal margin. There was slight oedema of both lower legs. Aside from mental lethargy, the central nervous system was not abnormal.

Rectal examination revealed three external haemorrhoids. The clinical impression was portal hypertension, cause undetermined.

Urinalysis: albumin 0.60 mgm. per 100 c.c.; otherwise negative. Red blood cells 4,120,000; Hb. 80%; white blood cells 6,000. Urea nitrogen 11 mgm. %; fasting blood sugar 104 gm. %; bilirubin 0.7 mgm. %. Total protein 6.63 gm. %; serum albumin 2.60 gm. %; serum globulin 4.03 gm. %. Cephalin flocculation 4 plus, Takata-Ara reaction positive. Bromsulphalein test, 27% retention after 45 minutes. Prothrombin time, 30 seconds. Blood Wassermann 4 plus, Kahn 4 plus. Spinal fluid Wassermann, negative. Ascitic fluid negative for tumour cells.

Course in hospital.—The patient went downhill steadily in a condition of typical hepatic insufficiency. On February 24, one of us (F.D.K.) on auscultation, noted a peculiar sighing sound over the right seventh costal cartilage. This sound had a rough quality and waxed and waned with the patient's respiration. This was interpreted as a venous hum. By firm pressure with the hand on the abdominal wall immediately to the left of the epigastrium, the venous hum could be made to disappear completely. Despite supportive therapy, the patient expired on March 12.

The final clinical diagnosis was Cruveilhier-Baumgarten syndrome. The etiology of the portal hypertension was considered to be either Laennec's cirrhosis, or syphilitic cirrhosis.

At autopsy, the liver was found to weigh 800 gm. The general shape and colour of the organ were well preserved but the entire surface was studded with fine, discrete nodules. The largest of these nodules measured 3 cm. in diameter. On section, the liver cut with increased resistance. The cut surface was a light golden brown with

many fine strands of fibrous tissue dividing the liver into indefinite lobules.

The portal vein at the porta hepatis was moderately dilated and divided into three branches. The left branch was 4 mm. in diameter and coursed over the surface of the left lobe of the liver. The right branch was also 4 mm. in diameter and passed directly into the liver substance. The third branch, the para-umbilical vein, was 5 mm. in diameter and ran in the free edge of the falciform ligament for a distance of 14 cm. and ended by dividing into numerous anastomotic channels on the abdominal wall just above the umbilicus.

The spleen was dark red, soft and smooth with evidences of capsular thickening. It weighed 800 gm. On section, it was homogeneously dark red. Malpighian bodies could not be

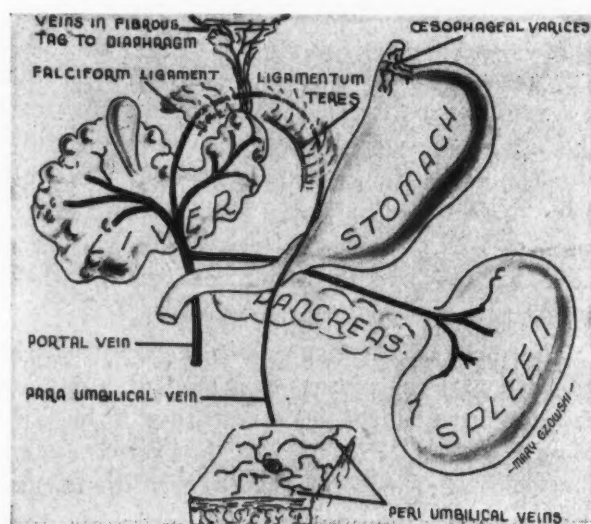


Fig. 1.—Schematic illustration of the pathological findings in a case of Cruveilhier-Baumgarten's syndrome.

identified. Other autopsy findings indicative of chronic portal hypertension were: oesophageal and gastric varices, haemorrhoids, dilated submucosal veins in the bladder and an ascites of 500 c.c. An incidental finding was diverticulosis of the colon.

Microscopically, a section through the falciform ligament close to the liver showed a mass of patent but empty venous channels and a condensed fibrous mass, presumably the ligamentum teres. Remote from this cord was one large, patent, thin-walled vein, presumably the para-umbilical vein.

Numerous sections taken through various parts of the liver all showed a similar picture. There was gross cirrhotic distortion of the nor-

mal liver architecture. This was not of the perilobular type. Within the parenchyma, there were a variable number of broad irregular fibrous areas from which narrower bands radiated out into the liver tissue breaking it up into irregular lobules which did not resemble liver lobules either in size or shape. In these lobules, there was loss of liver structure without destruction of the bile ducts. There was no evidence of bile duct regeneration. There were foci of biliary stasis as evidenced by bile thrombi. The separating bands of fibrous tissue were moderately vascular and showed a moderate chronic inflammatory exudate. The liver cords themselves were well preserved with minimal evidence of fatty degeneration. There was no evidence of necrosis, gumma or hæmachromatosis.

The sections of spleen showed a moderate thickening of the capsule with depletion of the cellular content of the pulp cords but retention of sinus trabeculae and a coarsening of the reticular framework. These observations were confirmed on sections stained by phosphotungstic acid and Masson's trichrome stain. The Malpighian corpuscles were of normal distribution with rare germinal centres. The red pulp was bloodless in some areas but in others showed marked engorgement of the sinuses with blood.

The pathological diagnosis was considered to be a toxic nodular cirrhosis of the liver of undetermined cause with an active, non-specific hepatitis and moderate biliary stasis and splenic changes due to chronic congestion.

The case is presented as one of Cruveilhier-Baumgarten syndrome evidently caused by a toxic degeneration of the liver. It presented the features of the condition clinically, namely, a diseased liver in the presence of dilated superficial abdominal veins; a venous hum over the epigastrium; the pathological findings of a patent para-umbilical vein, and an atrophic liver with a congested spleen. This condition is rare but should be considered in cases of liver hypofunction.

The authors wish to thank Dr. E. S. Mills for his help and for permission to publish this case. We also wish to acknowledge the helpful criticisms of Dr. H. S. Mitchell and of Dr. J. E. Pritchard in preparing this paper.

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PURULENT MENINGITIS DUE TO BACTERIUM PARATYPHOSUM B TYPE 3a, IN A NEWBORN*

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We wish to report the following case because: (1) purulent meningitis due to *B. paratyphosum B* is an exceedingly uncommon condition; (2) and the source of infection in this case was traced with absolute certainty.

Reviewing the cases of Salmonella meningitis reported in the literature between 1908 and 1937, Bahrenberg and Ecker¹ found nine cases due to *B. paratyphosum B*. According to these authors, five^{2 to 6} of these cases were too incompletely reported to be included in this series, and three^{7, 8, 9} were to be questioned because the agglutinin titre with specific antisera did not exceed 1:400, thus leaving only two authentic cases of para B meningitis, i.e., the one reported by Brahdy¹⁰ and their own observation.¹ In 1938, Gordon and Kennedy,¹¹ Schmidt¹² and Storey¹³ have each recorded a case of paratyphosum B meningitis. From 1939 to 1942, Caselli^{14, 15} and Patterson¹⁶ also added four cases, each of them reporting two cases.

CASE HISTORY

A boy of five weeks was admitted to hospital on January 17, 1948, because of convulsions, which had started on January 2, with occasional vomiting. Nothing relevant in the history. Rest of the family in good health.

Physical examination upon admission: temperature 102.2° F.; long drawn out tonic convulsions; nystagmus; no neck stiffness; no bulging of the fontanelle. Projectile vomiting once and two loose and foul stools.

January 18, temperature 105.3° F.; number of stools obviously increased. Patient received penicillin with no clinical improvement. January 24: penicillin stopped. January 26: fontanelle became tense; all feedings vomited; more convulsions. January 27: lumbar puncture yielded a frankly purulent cerebrospinal fluid with Gram-negative bacilli which were identified as *B. paratyphosum B*. Streptomycin was begun on same day. Patient was given 1 gram daily for 13 days. January 29: cerebrospinal fluid still yields *B. paratyphosum B*. January 30: a blood culture was negative after 48 hours' incubation; a Widal sero-agglutination test done with patient's serum was positive up to 1:2,560 with para B "H" antigen; and a culture of the stools yielded para B bacillus. On January 31, and February 1, two ventricular punctures were made which did not yield the para B bacillus. February 6: another Widal sero-diagnosis gave the same agglutinin titre as the previous one (1:2,560) with para B "H" antigen. February 8: (13th day of streptomycin treatment) clinical state was

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† Regarding Caselli's first observation¹⁴ it was impossible to refer to the original paper.

bad; temperature rose again; more convulsions; fontanelle still tense; streptomycin was stopped. Child expired 48 hours later, on February 10.

Autopsy.*—Cachectic body of a newborn, without any subcutaneous adipose tissue. The meningeal vessels were markedly dilated. The brain was very gelatinous in consistency. There were a few purulent foci at the base where the surface of the brain was covered with small and thin areas of purulent exudate beneath the arachnoid. The lateral ventricles were moderately distended and filled with turbid fluid, and the endothelial lining was studded with pin-point foci of congestion. The spleen was slightly enlarged, very soft and appeared deep red in colour.

All other viscera, including the small intestine and the colon, appeared normal. Samples were taken from the cerebral purulent infiltration, the spinal fluid, the heart blood, the spleen and the liver. Every one of these samples yielded pure cultures of *Salmonella paratyphosum B.* identified on carbohydrates and serologically.

Histology.—The mesenteric lymph nodes were without any typical lesions; no demonstrable Gram-negative bacilli. The spleen showed hyperplasia of the reticulo-endothelial cells and stasis. No pathological changes were found in the other viscera. No routine histological sections of the brain tissue were done.

spleen. Pure cultures of para B were obtained from the liver, the peritoneal exudate and the heart blood. Serological agglutination tests done with standard sera* gave the following titres: antityphoid serum = 1:40; antiparatyphoid A = 1:20; and antiparatyphoid B = 1:1,280. Another serologic analysis done with Oxford Standard immune sera gave agglutination up to 1:160 with antiparatyphosum B "H" specific serum. Antityphoid "H" and antiparatyphoid A "H" specific sera did not agglutinate at all. Two samples of this organism (one isolated from the cerebrospinal fluid and one isolated from the stools) were sent to the Laboratory of the Quebec Ministry of Health in Montreal to be typed by means of Vi bacteriophage.¹⁷ Both organisms were shown to belong to type 3a of *B. paratyphosum B.*

COMMENT

We believe that we have here a typical case of primary para B meningitis for the following reasons: (1) the convulsions began two weeks before we could observe any intestinal symptoms; (2) the macroscopic and microscopic study of the intestinal mucosa and the mesenteric

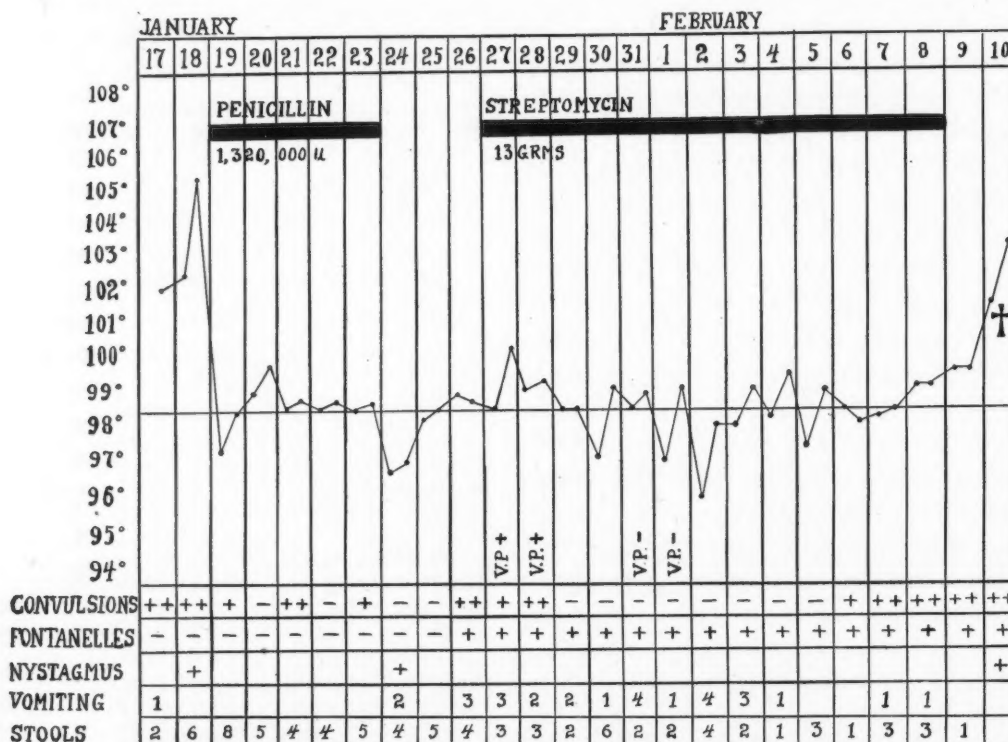


FIG 1—TEMPERATURE CHART AND MAIN SYMPTOMS V.P. VENTRICULOPUNCTURE

Bacteriology.—Upon examination of a stained smear of the cerebrospinal fluid, a fair number of short Gram-negative bacilli were found. This first sample of cerebrospinal fluid was cultivated on chocolate blood agar, giving a luxuriant growth of large mucoid colonies which were subcultured on MacConkey's medium and Difco's SS agar. The colonies picked off from MacConkey's medium and SS agar gave typical fermentation reactions of *B. paratyphosum B.*: acid and gas from dextrose, mannitol, maltose, xylose, arabinose and inositol; no acid and gas from lactose and sucrose; H_2S = +++; indol = 0. A suspension of the organism was injected intraperitoneally into a mouse. The animal died and the autopsy revealed numerous necrotic foci containing Gram-negative bacilli in the liver, and a marked hyperplasia of the reticulo-endothelial system in the

lymph nodes did not reveal any lesions, nor could we find any Gram-negative bacilli in stained sections of the lymph nodes. The presence of the organism in the stools does not necessarily prove that the bacilli made their way into the meninges through the intestinal tract and the blood stream. They could have been carried there by way of the blood stream and the bile during the septicæmic phase. As stated by Forbus,¹⁸ the location of the lesions in the alimentary tract, in typhoid fever, is

* Performed by Dr. J.-Edouard Morin.

* Park and Davis sera.

entirely determined by the distribution of the lymphoid tissue. There is a considerable doubt as to the exact site of entry. It appears that several routes may be involved. In this case the tonsils or the cribriform plate of the ethmoid would be the most probable portal of entry, though unfortunately, cultures of throat swabs which could help to sustain such an hypothesis were not done.

Founding our diagnosis on the criteria suggested by Bahrenberg and Ecker¹ (namely, the isolation of the organism from the cerebrospinal fluid, the biochemical reactions on carbohydrates, and an adequate antigenic analysis with specific sera), this case would be the eighth record of authentic paratyphosum B meningitis to be described in the whole medical literature. As a matter of fact, among the last seven cases reported since 1937, Schmidt's¹² and Storey's¹³ cases could be excluded from this series, since their reports do not include any data concerning the serological identification of the organisms isolated from the stools. Moreover, in Storey's¹³ case, the organisms seen on the cerebrospinal fluid smear were not even cultured.

But, a point which really deserves our attention in this observation is the epidemiological survey. Very few cases are reported in which the source of infection could be traced with absolute certainty. In fact, the only case is the one reported by Schmidt¹² where the infecting organism was found in the stools of the patient's mother and one sister. In the present case a thorough examination of the whole family was done. Samples of stools from the child's mother and all the other inmates were sent to our laboratory for bacteriological examinations. Repeated inoculations of the mother's faeces and urine on large plates of MacConkey's medium and Difco SS agar remained negative for paratyphosum B. The samples collected from the grandmother and grandfather, who were living in the same house, yielded abundant cultures of *B. paratyphosum* B. Both of these strains were also typed by means of the Vi bacteriophages and shown to belong to the same type as the strains isolated from the child, i.e., type 3a.¹⁷

It is very likely that this child was infected by his grandmother at the time of his birth or very shortly afterwards, since the first symptoms of meningitis appeared around two weeks after birth, this being the approximate incubation period in paratyphoid fever.

SUMMARY

A fatal case of primary purulent meningitis due to *Salmonella paratyphosum* B, type 3a, in a boy of five weeks is reported. This is the eighth authentic case to be recorded in the whole literature, and the first in which the source of infection has been traced with certainty by means of a specific bacteriophage. The pathogenesis is also discussed.

Clinical data were kindly furnished by Dr. M. Langlois, chief of the Department of Pædiatrics, St. Sacrement Hospital, Que. The technical assistance of Sister Marguerite du Saint-Sacrement is gratefully acknowledged.

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SEPTATE VAGINA COMPLICATED BY PREGNANCY

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A case of double vagina with pregnancy will be reported with a brief review of some of the literature concerning etiology, incidence, diagnosis, and management.

Embryology.—Union of the Müllerian ducts in the third month of fetal life results in formation of the uterus and vagina.¹ The septum in the uterus disappears from below upwards and this progress should be complete at three and one-half months. Malformations of the uterus result from an arrest of this progress at some point. At the middle of the third month, the vaginal cord formed by Müllerian epithelial linings proliferates into the tissue of the genital cord. The vagina is formed by the breaking down of the epithelial core in the fifth month.

Longitudinal septa in the vagina result from incomplete fusion of the two vaginal cords. Transverse septa result from incomplete fusion of the two vaginal cords. Transverse septa result when fusing of the Müllerian ducts fails to coalesce with the urogenital sinus below. These septa are usually situated just above the hymen. Longitudinal septa may be complete or incomplete, or they may be fenestrated. Some feel that they are generally an indication of a duplex anomaly of the uterus.²

All degrees of lack of fusion of the Müllerian ducts exist and the uterus alone, the uterus and the vagina together, or the vagina alone may be affected. Considerable confusion seems to exist with regard to terminology especially with regard to uterine anomalies. Taylor⁶ suggests a simplified classification as follows: (1) Uterus arcuatus. (2) Double uterus with a single cervix. (3) Septate uterus with a single or septate vagina. (4) Double uterus with a double cervix. (5) Uterus with a rudimentary horn or absence of one horn.

This includes most cases of uterine anomalies but the vaginal anomalies should be added as well. This has been done by Olesker⁹ in his report of two cases. (1) Septate vagina with normal uterus and tubes. (2) Atresia of vagina. (3) Absence of vagina. (4) Imperforate hymen. (5) Vagina opening into urethra instead of vestibule. (6) Pseudohermaphroditism. The case to be reported falls in the first group of this classification.

Frequency of occurrence.—Killinger and McEwen⁴ suggest that these anomalies occur more frequently than is generally believed and present a case of double vagina, two cervices, two cervical canals and two separate uteri, each uterus having a single normal tube. This was conclusively proved by hysterosalpingography. There was no pregnancy in this case. Taylor⁶ states that these anomalies occur once in 1,500 obstetric and about once in 2,000 gynaecological cases. Falls⁷ points out that mild degrees of bicornuate uterus are more common. He estimates the frequency at about 1%.

Diagnosis.—In the case reported by Killinger and McEwen⁴ the presenting symptoms were lower abdominal pain aggravated by intercourse, irregular menses, severe cramps with menses, sterility and absence of gratification in the sexual act. Schaufler³ reported 11 cases of duplex anomalies of the utero-vaginal tract all

of whom had one or more pregnancies. He stresses menstrual irregularities, dyspareunia, repeated unexplained abortion and unexplained repeated breech or transverse position as diagnostic points obtained from the history. The diagnosis is made by pelvic examination with visualization of the vagina and cervix, by the use of metal sounds and by hysterosalpingograms. The latter two of course can not be used during pregnancy.

Taylor⁶ points out that the diagnosis is not usually made until pregnancy takes place, unless dyspareunia is the presenting symptom, which is rare. The presence of any vaginal anomaly should lead one to suspect uterine anomalies and possibly anomalies of the urinary tract as well. Falls⁷ states that oblique presentations in primiparae are presumptive evidence of mild degrees of bicornuate uterus. He also noted a deviation of the uterus to one side of the abdomen in many cases and frequently unusual breadth of the fundus or a notch in its upper surface was seen. Irregularity of the fetal heart during pregnancy and labour was also common.

Management.—Where uterine anomalies are present fertility is high but miscarriage is also frequent. Schaufler³ states that most of these patients may be allowed to become pregnant but must be made to understand the potential difficulties. In these cases he points out the necessity for careful surveillance of the uterus to detect malpositions of the fetus and attention to the non-pregnant horn lest it threaten to be a dystocic factor. Wheat germ oil derivatives and progesterone may be indicated. Operative equipment should be available at delivery for the management of vaginal and cervical anomalies and for Cæsarean section if indicated.

Falls⁷ found that post partum hæmorrhage was more common. He also advised serious consideration of Cæsarean section if the fetal heart was constantly irregular in the later weeks of pregnancy. Findley,⁵ in reporting a series of pregnancies in patients with uterus didelphys, states that the management of pregnancy and labour should be the same as that in pregnancy in the normal uterus except in the event of complications. Spontaneous delivery is the rule in these cases. Perrigard⁸ describes the case of a primigravida at three months in which there were found two distinct vaginæ, two cervices and two uteri. The vaginal septum was removed and

the pregnancy in the left uterus was apparently maintained.

Olesker⁹ reports two cases of septate vagina in which there was no surgical intervention. One patient had nine spontaneous deliveries without mishap except that the septum was torn. The other patient delivered a breech and a vertex spontaneously and the septum remained intact.

Mrs. G.G., aged 22. The patient was first seen on June 29, 1946, complaining of difficult menses ever since their onset, but worse since her marriage three years previously. She suffered severe lower abdominal pains, nausea, vomiting and headaches which forced her to bed for the first day or two. The flow was normal except that there were many clots passed the first two days. Duration of menses was five days and the cycle varied from twenty-six to thirty-five days. Age at onset was thirteen years. She also complained of infertility.

She had had an appendectomy five years before and mumps two years previously which was followed by a menstrual period lasting two weeks. Her health had otherwise been good.

Her period had begun the day before the visit. Physical examination was completely negative except for the pelvic findings. Visual inspection of the vagina revealed a complete longitudinal septum extending from the vault to the hymen. There was a single cervix in the right vagina. Palpation of the uterus did not reveal any abnormalities.

She was to return in one week for hysterosalpingography but she did not keep this appointment because of road conditions.

She was not seen again until August 24, 1946. She had had no period since her last visit, was complaining of morning sickness and urinary frequency, and after examination a diagnosis of pregnancy was made. The course of the pregnancy was uneventful. It was felt that the septum should be left undisturbed as the worst complication would be a torn septum.

A modified Watson's induction was begun on March 31, 1947 and after a ten-hour labour a normal male child in the vertex presentation and right occipito-anterior position was delivered. The baby weighed seven pounds, fifteen ounces. A left medio-lateral episiotomy was necessary. The septum tore from top to bottom; the tags were excised and a few sutures were placed at the junction of the septum with the vaginal wall to control bleeding, which was not excessive.

The post-partum course was likewise uneventful.

Pelvic examination on June 12, 1947, revealed no evidence of the septum. Hysterosalpingography was also done at this time and the uterus and tubes were found to be normal.

SUMMARY

A case of double vagina complicated by pregnancy has been presented, following a brief review of the literature. This case substantiates the opinion of many others that surgical intervention is usually unnecessary.

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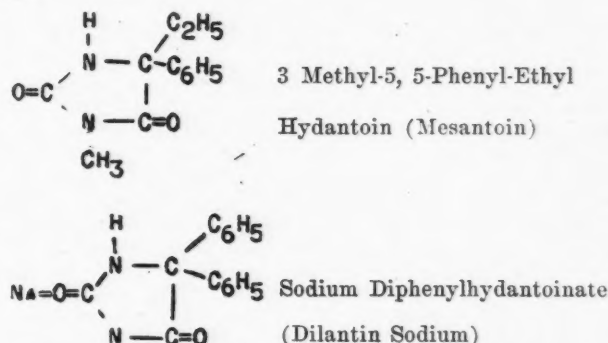
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ACUTE APLASTIC ANÆMIA DURING MESANTOIN THERAPY*

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Preliminary reports on the use of mesantoin (3 methyl-5, 5-phenyl-ethyl hydantoin) in the treatment of epilepsy appeared in 1945 and 1946.^{1 to 4} The drug first became available for general prescription early in 1947. Its value appears to be mainly limited to the control of grand mal epilepsy although psychomotor seizures have occasionally been benefited. The consensus is that it is seldom effective in petit mal, although Marburg and Helfand⁵ report marked improvement in some of their cases. Mesantoin is closely allied to dilantin sodium, as shown by comparison of their chemical configuration.



Mesantoin has been used to replace dilantin in patients suffering marked gingival hypertrophy from the latter drug; also in cases showing various toxic manifestations such as diplopia, nystagmus, ataxia or skin eruptions. It has been used in combination with dilantin in cases with unsatisfactory response to dilantin alone. Mesantoin, for some patients, seems to control seizures better than the other drugs. In addition there is an agreeable taste which makes it more adaptable to infants and children; a relative absence of side effects such as gingival hypertrophy and hirsutism; and a definite synergism between its action and that of sodium dilantin.

Most writers have agreed that toxic and side effects from mesantoin are few. Drowsiness and skin rashes have been mentioned. Loscalzo⁶ noted no changes in the blood picture of

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At no time was there any evidence of any regenerate change in the blood picture. Moderately profuse vaginal bleeding persisted throughout. Bleeding from the nose, gums and cracked lips necessitated the use of thrombin and gelfoam packs. The temperature ranged from 101 to 106° during the last two days of life. The patient expired on May 19, 9 days after admission.

*Abstract of post-mortem examination.**—Petechial hæmorrhages were present in the skin, lungs, pleura, pericardium, heart, mucous membranes of small and large intestine and urinary bladder. The urinary pelves and ureters bilaterally contained practically solid blood casts.

Grossly the bone marrow from the sternum and vertebræ appeared slightly paler than usual. Microscopically the bone marrow was markedly acellular with members of the granular series rare, and there was a quantitative diminution in the erythrocytic series. No adult megakaryocytes were seen, and there were scattered small areas of necrosis in the sternal marrow. Post-mortem blood culture showed heavy growth of *pseudomonas aeruginosa* and moderate growth of *E. coli communis* and *Clostridium perfringens*.

DISCUSSION

It is possible that this may have been a case of so-called idiopathic aplastic anæmia with no relation to the medication, but this seems unlikely. The cause of death was undoubtedly a condition of aplastic anæmia with hypoplasia of the bone marrow. The only drugs which the patient had been taking were phenobarbital (15 years) and mesantoin (10 months). As in previous cases attributed to tridione, the onset of the blood condition was sudden and acute and all therapeutic measures were ineffective.

Due to the similarity in chemical structure between mesantoin and dilantin sodium we have searched the literature for reports of blood dyscrasias observed during dilantin therapy. Merritt and Putnam¹¹ reported no severe disturbances in the hæmatopoietic system although a slight secondary anæmia occurred in a small number of patients which could not be directly related to the dilantin therapy. There was no consistent change in the white blood count, although a few patients developed slight eosinophilia. Merritt and Putnam¹² in another report stated that frequent examinations of the blood in 200 patients receiving dilantin had failed to reveal any evidence of damage to the hæmatopoietic system.

Since tridione is known to be capable of producing agranulocytosis and aplastic anæmia, most clinics do routine blood studies. No such precautions have been observed with mesantoin. Ruskin⁷ felt that all patients on mesantoin therapy should have blood counts made

before and during treatment, and that the drug should be administered in small initial doses with slow increases.

It is possible that we will have to reassess our views regarding the toxicity of mesantoin if cases of similar nature are reported in the future.

SUMMARY

A case of acute aplastic anæmia occurred during mesantoin therapy of epilepsy. Fresh blood transfusions, pyridoxine, folic acid and other forms of therapy were ineffective. The patient died. The pertinent literature has been reviewed.

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The everyday feats of Indian classical dancers would baffle the anatomists. Many of their dances start with a series of lateral movements of the head, without rotation in any plane. This seems to be an arthrological impossibility. Then, with arms outstretched, a rippling wave starts at the finger-tips of one hand, passes up the forearm and arm, across the shoulders, and down the arm and forearm to the finger-tips of the other hand. Try these two movements in front of your bedroom mirror, and you will not be surprised to learn that the training of an Indian dancer takes twelve years.

These reflections were prompted by the demonstration of his superb art by Ram Gopal at the reopening ceremony of the Indian Section of the Victoria and Albert Museum. An Indian classical dancer has to learn many thousands of traditional stylized movements, each one of which has a particular meaning. Every limb has its own catalogue of movements; the number of facial expressions runs into thousands and there are five thousand separate gestures of the hands. These are all learned early in the dancer's training, and later they are blended into dances. A dance is thus full of meaning; every gesture and expression, however slight, has a definite significance and is as much an organic part of the whole as is every phrase uttered by every instrument in an orchestral piece.

It follows that Indian classical dancing is a most difficult and exacting discipline. Every movement is precisely regulated; an extraneous gesture, an inaccurate facial expression, an unintentional flourish may alter the whole meaning of a dance. And yet, Ram Gopal and his pupils appear to be free and spontaneous in their movements. Dancing to simple rhythms, they blend their gestures into a flowing and profoundly beautiful work of art.—*The Lancet*, October 11, 1947.

* Abstract obtained from the Autopsy Service of the Pathological Institute through the kindness of the Director, Professor G. Lyman Duff.

THE CANADIAN MEDICAL ASSOCIATION**Editorial Offices—3640 University Street, Montreal***(Information regarding contributions and advertising will be found on the second page following the reading material.)***EDITORIAL****ON RESEARCH**

THE very word "research" has become loaded with complexity. To re-search is to look again for something, with more intensity perhaps, but not necessarily. The searching is the main thing. When Job said, "the cause which I knew not I searched out" he put himself in the class of a research worker. This may be over-simplification, for undoubtedly research has many deep and far-stretching roots, but many men do what is essentially research without either getting or claiming credit for it. There is at least one essential for work to be dignified as research—integrity of mind. With that a man may or may not do something. Without it he never even begins.

But research as it is generally understood has many aspects. Some of these are brought out in a recent series of papers in the *British Medical Journal* (September 4, 1948), led most appropriately and attractively by Sir Henry Dale with comments on the part played by accident and opportunism in medical research. Surely in many men's minds there must be the hope of the lucky chance on which they will be able to ride to fame. The accident of noticing the phenomenon of a falling apple; of finding strange accidental shadows of solid objects in working with a Crookes tube; of puzzling over the freedom from smallpox in dairy maids; of the contamination of a culture of staphylococcus by a mould. In Macaulay's phrase, every schoolboy knows the story behind each of these, and Sir Henry adds several others not so well known. But of course the accident must happen to the right type of mind. Many men had watched apples fall: many culture plates had been contaminated by *P. notatum*; even the shadows of objects not penetrated by x-rays had been seen. But only a

Newton, a Fleming and a Roentgen searched into them.

And yet there is probably no field of human activity in which the value of "assists", to use a sporting term, is so likely to be overlooked as in research work.

Sir Henry Dale well says:

"Incidents of the kind which I have described may greatly advance the date of a discovery or may associate it with the name of a particular investigator, but I do not believe that they will ever produce discoveries which would not eventually be made without them. They may provide, however, touches of high light in the varied landscape of science, of decoration to its solid building or of light relief to the more serious drama of its normal and logical advancement."

In another paper in this series Dr. L. J. Watts shows that first class clinical research has been and is being done by men busy in practice. But again it is not a simple matter. The essential requirement is that a man should be able to command his time. That is not easy in general practice. So that it becomes largely a matter of clinical research in hospitals. Fresh problems then immediately develop. Hospital life is a thing of itself. Should the research be only in special clinics? How large should a research unit be? How to prevent the labours of administration from choking research? How much of a given subject, say hæmatology, should a man try to follow, for he certainly cannot keep up with all the developments even in such a highly specialized field?

Finally, the subject of research in general practice is dealt with by Dr. Wm. N. Pickles. He quotes Pasteur's "In the field of observation chance favours only the mind which is prepared", and his paper is full of instances in which the country doctor can make observations which are true research; perhaps more than anyone else the general practitioner can follow problems of heredity. But there are epidemiological questions, to say nothing of unanswered questions in prognosis.

Complex and difficult as research may be it is still possible for a man to gnaw off his own problem. But if he is to do research alone he must be sure that he is suited to it. Research workers as such are extremely rare birds and many men probably waste time doing research.

EDITORIAL COMMENTS

Twenty-fifth Anniversary of "The Canadian Hospital"

This month and year marks the 25th anniversary of the establishment of *The Canadian Hospital*, which has served as the official journal of the Canadian Hospital Council since 1935. To those who read it there is little need to dwell on its place in Canadian medical journalism. It deals with that intricate necessity the hospital, in all its many phases. It manages to keep before us a continually developing picture of the changes and growth in the hospital world, and certainly provides a source of information on hospital problems in Canada which is both indispensable and unrivalled. Its success must be chiefly attributed to one man, Dr. Harvey Agnew, its editor, who adorns its pages not only with verbal contributions from his wide experience, but with charming illustrations of his own gifted draughtsmanship. It is with especial pleasure that we note this anniversary and extend to *The Canadian Hospital* our congratulations and best wishes for long-continued prosperity.

An Unusual Mental Hospital Aide

It is peculiarly interesting to hear of those who develop qualities which exactly fit them for special work. The last number of *Hygeia** contains an account of a 42-year-old negro veteran who won an award of \$500.00 given by the National Mental Hospital Health Foundation for the outstanding psychiatric aide of the year. He was chosen from 12,000 attendants in private and public mental hospitals all over the States, and it seems from the account that the outstanding quality of his personality is his simplicity and kindness of manner. His is the kind of work which of course should call for these qualities and probably most of the 12,000 others had them in varying degree. But apparently Walter Starnes exercises them with a spontaneous benignity which raises his work far above the routine methods of managing psychiatric cases.

* Walter Starnes, 42-year-old veteran, wins "Aide of the Year" award: *Hygeia*, 27: 18, 1949.

A method has been developed to determine the amount of carbon monoxide in the air by the reaction of red mercuric oxide with this poisonous gas. The reaction forms carbon dioxide gas and mercury vapour.

MEN and BOOKS

RICHARD HAYDOCK

Being the Account of a Jacobean Physician
Who Is also known to History as
"The Sleeping Clergyman"*

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But, good God, what an age is this and what a world is this, that a man cannot live without playing the knave and dissimulating.—Samuel Pepys (in 1661).

I.

It is altogether an enchanting circumstance that there should be in the long portrait-gallery of medical history a figure dubbed "the sleeping clergyman". We find him in a dusty recess, and for once fancy mocks the austere figures lording it over the strange forgotten portrait. The first hint of his existence came to me fittingly enough from that engaging man of letters, Augustine Birrell who, in one of his *Obiter Dicta* essays, mentions this quixotic bit of history. That sent us to the letters of the sober gossip, John Chamberlain, whose name is familiar to every historian of the reigns of Elizabeth and James the First. There followed glimpses of the man in the measured chronicles of the seventeenth century. It appears that these historians, probing in the quiet backwaters of history, had a smile at the expense of our quarry, a custom which we hope will continue, please God, until the day dawns when men cease to forget themselves in trifles. But all these scraps and hints do not add up to make a portrait. They are like a number of jigsaw pieces to which we have to add others reconstructed in imagination to complete the puzzle. When the task is done, we are rewarded with an eccentric figure playing out his part in such a ludicrous situation that carping historical criticism and morality itself are all but disarmed.

We may take up our historical point of vantage in the year 1605. James the First, grotesque in body and mind, has been on the English throne for two years. Secure in his claim to the divine right of kings, he is aggressively mixing in the theological and religious troubles of the time, for it is the eve of the Gunpowder Plot. He is harrying Parliament for money and finding that the temper of that body is beginning to harden. It is a lively time of intrigue in political and theological circles. While nobles jockey for favour, the Puritans are extending their influence. Writers and scholars are busy in every field, and universities, the stage and, to a less degree,

* Read at the Annual Meeting of the Canadian Medical Association, Section of Historical Medicine, June 25, 1948.

science share in the ferment. Above all it is an age of controversy on every subject under the sun, from witchcraft to tobacco, with the added fillip that the penalty for incurring the disfavour of the king and the ruling powers in such controversies may involve imprisonment or at least having one's ears lopped off.

It was this stage that our hero, Richard Haydock trod. He made a brief entrance and exit. In the *dramatis personæ* he is to be found in the group of the "lords, gentlemen and attendants", lumped together according to custom at the end of the list of the principal characters. For in this year, 1605, there is talk in London-town of the Oxford preaching physician. Here is a "seven days' wonder".



Fig. 1.—Title page of volume published by Richard Haydock in 1599. (By permission of the Librarian, Bodleian Library, Oxford.)

Master Richard Haydock, "physitian," makes his brief appearance among the crowd of moral musketeers and political swashbucklers of his age and then is gone.

II.

The salient facts of the man's life are assembled easily enough. He was born at Grewel in Hampshire about 1570, attended Wykeham's school in Winchester and took the degree in arts at New College, Oxford in 1592. Three years later he received his M.A. and was made a Fellow of New College. After travelling on the continent he returned to Oxford to

study physic and received his degree of M.D. in 1601. During this time he published a book, *A Treatise containing the Artes of Curious Paintynge, Carvyng and Building*. It appeared in 1598 and is the translation of an Italian work by Joh. Paul Lomatius, a painter of Milan. The title page (Fig. 1) has the picture of Richard Haydock and the inscription "Englished by R.H., a student in Physik, Oxford". It was dedicated to "Thos. Bodley, Esq.", Oxford's famous patron of the arts.

After obtaining his medical degree, Haydock remained in Oxford where he combined the practice of physic and an equally interesting practice of theology with such exciting and weird results that by 1605 he had achieved a notoriety that reached the ears of the Court. Presently he was summoned before that doughty theologian, the king, and after a brief but decisive encounter turned his back upon Oxford and settled in Salisbury where, according to a scribe of the time, he "lived always a physician of good repute". Like many another temporarily troubled by ambition, his fall was swift. But his penance was sincere. He had learned his lesson. From this time on there is a tantalizing silence concerning the humbled Haydock, which probably indicates that he lived a life of complete conformity, going about his business like any ordinary mortal. He had returned to the obscurity of the many. We finally have it that he retired to London and died just before the outbreak of civil war in 1642.

This was the man, then, of whom we might say, as Gabriel Harvey wrote of John Lyly in fine rollicking fashion in 1593, that he was "sometime the fiddle-sticke of Oxford, now the very bable of London". But the flavour of his story is to be found in the contemporary accounts to which we now turn. First of all, John Chamberlain writing to his friend, Sir Dudley Carleton, April 30, 1605, after remarking upon the scantiness of news, proceeds: "... then Haddock of New College, the sleeping preacher, so much followed and admired in Oxford and everywhere, being sent for to the court and there playing his prises, was discovered and confessed himself an impostor". Having our curiosity thus aroused we go on to Stowe's *Annals of England* (1631 edition) where in the chapter dealing with "The Life and Raigne of King James" there is the following passage:

Richard Haydock of New College in Oxford, a professed physitian pretended to preach in his sleepe, and having an imperfection in his usual or dayly speech, yet by his nightlie practise in his private chamber, hee attained a very good delivery of his mind, and carried himselfe so cunningly, that hee would often seeme in his private chamber, to preach in his sleep. And being divers times by such as were neare him, who though they called or spake unto him never so oft, or earnestly: yea though they stirted or pulled him by the hands and feete, &c, yet would hee make no manner of answere at all,

but persistet smoothly on, keeping his countenance: whereupon his fame was spread throughout the land, by the name of the sleeping preacher: at last the king commanded him to bee brought to the court, where his Majestie sate up the most part of the night, attending the event, and at length, the seeming sleeper began to pray: then pronounced a text, made his division of his text: and applying it to his purpose, for in his preaching he used to inveigh against the Pope, against the Crosse in baptism, and against the last Canons of the Church of England: and having ended his Sermon seemed to continue sleeping: his Majestie having thoroughly observed, what he had there heard and seene, departed to his lodging, and within a few dayes after called the sayd Haydocke before him: after some conference, the King in his Princely wisdom uncovered all his butts and practice. The offender being no way able to justifie himselfe, acknowledged his abuse unto God, to his Majestie and the World, and humbly besought mercy of his Majestie: the King most graciously pardoned him conditionally that in all places hee would acknowledge and confesse his offence, because the people greatly supposed, and many verily beleevd his nocturnal preaching as either by inspiration or by vision.

And upon May day the said Haydocke came to Lambeth, and asked particular forgiveness, of the most reverend Father in God Richard Bancroft, Lord Archbishop.

Word of the sayd sleeping Preachers confession copied by the originall of his owne hand.

I doe in the naked simplicitie of a thankfull, and most penitent heart ingeniously confesse, and acknowledge, that this use of my nocturnall discourse, when indeed I was waking and had perforce sense of that I conceived, and spake, then when by day I attempted the same, was from the beginning, a voluntary thing done with knowledge upon a discovery in my selfe of a greater abilitie and freedom of invention, memory, and speech in that mild quiet, and silent repose of the night: than in the daytime I found.

In the *History of Great Britain* by Arthur Wilson, Esq. (London, 1653) there is this account:

The King took delight by the line of his Reason to sound the depths of such brutish Impostors, and he discovered many: For in the beginning of his Reign, Richard Haydock of New College in Oxford, practised Physick in the day, and preached in the night in his bed. His Practice came by his Profession, and his Preaching (as he pretended) by Revelation: For he would take a Text in his sleep, and deliver a good Sermon upon it, and though his Auditorie were willing to silence him, by pulling, haling, and pinching, yet would he pertinaciously persist to the end, and sleep still. The fame of this sleeping Preacher flies abroad with a light Wing, which coming to the Kings knowledge, he commanded him to the Court, where he sat up one night to hear him: And when the time came that the Preacher thought it was fit for him to be asleep, he began with a Prayer, then took a Text of Scripture, which he significantly enough insisted on a while, but after made an excursion against the Pope, the Cross in Baptism, and the last Canons of the Church of England, and so concluded sleeping. The King would not trouble him that night, letting him rest after his labors, but sent for him the next morning, and in private so handled him like a cunning Surgeon, that he found out the sore; making him confess not only his sin and error in the act, but the cause that urged him to it, which was, That he apprehended himself as a buried man in the Universitie, being of a low condition, and if something eminent and remarkable did not spring from him, to give life to his Reputation, he should never appear any body, which made him attempt this Novelty to be taken notice of. The King, finding him ingenious

in his Confession, pardoned him, and (after his Recantation publicly) gave him preferment in the Church.

Our erring physician-theologian, however, refused any ecclesiastical post and did not take orders, as we learn from Wood's *Athenæ Oxonienses* (1691). Instead he hied himself off to Salisbury where he settled down to the more prosaic business of medical practice. It is diverting to imagine what would have happened if he had accepted the patronage of the king and taken a "living". Some of the posts might have been tempting, but it would appear that by this time Haydock had put the devil of ambition behind him. Certainly, like the men of his time, he felt that man without the inspiration of God is a thing of naught and a vain shadow. But when it came to taking orders he demurred, doubtless remembering the saying of St. Bernard that he would live upon the sins of the people. Instead he chose it seems to live as a physician upon the frailties of the people. And it should be remembered that, in making such a choice, in the eyes of the time he exchanged the exalted position of the cleric for the more plebeian calling of the physician.

In reading these accounts, certain phrases have more than common interest. Even if we dismiss the man as a "queer fish", there are some very human touches in his story. He is not the first to possess an overmastering desire to astonish the world. Many a one before or since has felt himself "a buried man in the Universitie", or complained that, as a very small potato indeed, he "should never appear any body" in his small corner of the universe. Haydock to gain the world's favour exploited the most popular sport of his day and generation—preaching—and in that way he hoped to rise above donnish obscurity. Nowadays he would have employed a clever publicity agent.

Note also that he had "an imperfection in his usual or dayly speech", and it is rather pathetic to find him correcting this by his trance-like nocturnal sessions rather than practising speech in front of a mirror or trying other means that men have found to improve their delivery or to rise above an impediment in speech. And who has not on some occasion felt himself to be inspired during the night watches, only to find (unlike Haydock) that in the cold logical light of morning what he had conned or written was pretty thin stuff?

But the encounter between the king and "physitian" Haydock is the central point of the story. We can see them in serious conference, the sober but by no means stupid Haydock and the "upstart Stuart" from Scotland with his tedious follies, his strange lack of charm and tact, his preposterous claims and his eternal theology. Beneath a grotesque exterior—big head, slobbery tongue, rickety legs, goggle eyes, Green describes it—James, "the wisest fool in Christendom", possessed much shrewdness and

learning, canny humour and an agile mind particularly in theological matters. Our poor doctor must have felt Theology towering over him and the divine right of kings to boot. Who is to blame him if he recanted and speedily decided on the less hazardous career of medical practice? Besides, the king could crack down on occasion. We read that one "Williams that wrote the libell of Balaam's asse and the commentary upon it to the King . . . was arraigned on Monday last at the King's Bench, and on Wensday hangd, drawne and quartered over against the mewes at Charing Crosse." James was particularly critical of sermons, not even sparing those in high places. The chronicle runs: "Somewhat in the bishop of London's sermon on Christmas Day gave the King so little content that he grew loude, and the bishop was driven to end abruptly." We are told also of John Davidson, another preacher who got into trouble with King James "by reason of his plain speaking".

In the light of all this it cannot be contended seriously that our hero was a trifle "cracked". Under the king's prodding he saw where his performance was leading him, but not before he had staged a pure piece of exhibitionism which was destined to give him a slender hold on the immortality that is granted by the annals of history. And it must be said that James displays himself in this scene not unattractively. After showing his prowess as a theological swordsman, he unbends and apparently thinks well enough of his victim to offer him preferment in the Church which Haydock, who could hardly expect to preach to his congregation at night, wisely declined.

III.

While there is humour and charm in this tale of Richard Haydock, its real significance lies in the light which it throws on the thought and temper of the early seventeenth century. Our physician illustrates in himself the beginning separation of theology and medicine, the transition from the spiritual imaginings and discipline of ancient thought to the rational materialistic outlook of modern science. Haydock and the men of his time were beginning to feel the passing of the Renaissance into the first dawning of the modern world in the beginnings of Puritanism. The last great expression of the ancient faith came late in the sixteenth century. Saint Teresa of Avila died in 1582 and St. John of the Cross in 1591. Meanwhile Copernicus had already set the earth in motion and America was appearing on the western horizon. While John Donne appointed by King James to the deanship of St. Paul's was putting a trumpet to his lips whenever he preached at Paul's Cross, the rational enquiry into the nature of the universe was under way, and it affected the province of medicine no less than those of philosophy, theology and social life. As a writer of the

time puts it, "The sonnes of Adam were as busie as ever he himself was about the Tree of Knowledge of good and evil, shaking the boughs of it, and scrambling for the fruit".

This early budding of the conflict between superstition and spiritual authority on the one hand and reason and science on the other produced a phenomenon which while present at all times found unique expression in the seventeenth century—the power of the human mind to accommodate inconsistencies within itself. Man in this age showed himself plainly as "the great amphibium", a being capable of living in two worlds at once with no great consciousness of any conflict. This is probably seen best in the great physician-writer, Sir Thomas Browne, who aptly described himself and others of his time in his odd definition of man as "that amphibious piece between a corporal and a spiritual essence".

In Haydock we may see in a more humble and bizarre fashion the same antithesis as we see in Browne—a physician going about his "drudging practise" as Sir Thomas called it whose mind is at the same time capable of spiral convolutions to the point of eccentricity. For divinity in conflict with scientific and medical gropings produces rare flights of idiosyncrasy, to say the least. Haydock's preaching conceit is one of Browne's crotchets blown up to monstrous proportions. For the good Sir Thomas had his own crotchets as did other medical men and writers of the time. Witness Browne's conviction that the number five manifests itself as some mystical secret. He was forever turning up the quincunx; starfish had five points, feet possessed five toes, scripture records five wise and foolish virgins, and so on.

The vision of the world of these men is not unlike that represented in old tapestries where unicorns, serpents, salamanders and grotesque figures mix freely with men. Sir Thomas Browne was able to put these visions into words to the delight of posterity. Probably poor Haydock attempted to do the same in semi-somnambulistic fashion, but he succeeded in achieving only words without Browne's music.

This is not to suggest that the men of the seventeenth century were mooning metaphysicians. There were mighty men in those days in every level of society, vigorous, high-tempered fellows, some of them like the king himself mighty gluttons and toss-pots before the Lord. There were men who could handle English in the high style—masters of the winged word. Ben Jonson who was the glory of the stage in Haydock's time shows what can be done in the line of invective in his foreword to *Volpone*. So that Haydock in his nocturnal ranting was merely indulging in the general love of speech for its own sake, albeit in a queer guise.

The pulpit was the ruling rostrum of the time. Puritan and Royalist alike were prodigious

sermon-tasters. In a letter John Chamberlain whom we have already referred to says: "We had plenty of preaching here this Christmas. The Bishop and the Deane performed theyre parts very well, and D. Pasfield was not much behind them, but your brother Dove (an evangelical parson with Calvinistic leanings) swept the Scriptures together upon heapes". That last expression seems the very acme of a dazzling preaching performance. And through the pulpit the king strove to sway the customs of the time. Chamberlain writes on January 25, 1620:

"Yesterday the bishop of London called together all his clergie about this towne, and told them he had expresse commandment from the King to will them to inveigh vehemently against the insolencie of our women, and theyre wearing of brode brimed hats, pointed doublets, theyre haire cut short or shorne, and some of them stilettoes or poinards, and such other trincets of like moment; adding withall that if pulpit admonitions will not reforme them he wold proceed by another course; the truth is the world is very much out of order, but whether this will mende it God knowes."

At times the king himself took a hand. The witty Halifax observed of Charles I's sermons: "Though he wrote them with his own hand, yet no word of them his own". And as one would expect under such circumstances, sermons made and destroyed men. A sharp rebuke from the king with a demand for retraction of what had been said was obeyed or dire consequences followed. There is the poor clergyman for example who, in sheer thoughtlessness, on the Hanoverian succession preached a sermon with the exquisitely unhappy text: "Sufficient unto the day is the evil thereof". Needless to say he landed in limbo.

Such an age was bound to be rich in eccentrics. Ireland, always the prime breeding ground for such colourful folk, contributed many, but Scotland and England had their share who wandered the countryside or sat in the stocks to entertain the bystanders. Some were simple, others magnificently crack-brained. History is apt to call them mad to save the worry of trying to comprehend them. On the fringe of this company is to be found a man like Richard Haydock, one of the fantastics and eccentrics who are the fascinating gargoyles of English social history. Medicine has had its share of such gnarled people, some of them splendid crackpots. If one may judge from medical annals, they were more prolific later in the eighteenth century, the Age of Reason: such men as Dr. Messenger Mounsey, Dr. George Fordyce, the three-bottle anatomist, Dr. Cheyne, the explosive Dr. John Radcliffe.

IV.

We know little of Haydock as a physician except that he graduated from Oxford and therefore represented the better than average book-trained medical man of his time. The fact of his strong theological bias is not surprising,

as before 1600 a large proportion of medical students in the universities had clerical status. He was thus the university medical graduate, bred in the literature of Galen, walled round with mediæval learning, possessing a considerable training in botany, a small but working knowledge of anatomy and physiology and an increasing interest in physics and chemistry as a result of the writings of Gilbert and Mayerne.

The truth is that the golden days of good Queen Bess can hardly be said to include medicine, which was influenced very little by the Renaissance, and the great advances in art and literature, exploration and science in Tudor England were not equalled by any notable development in medicine. Haydock must have been an ageing practitioner in his town of Salisbury before medicine began to throw off the bonds of mediævalism. Thus it was that competent practitioners in England were few, and while the Royal College of Physicians, the Church and the universities attempted to control the licensing laws, most of the actual practice of the land was in the hands of men who had little knowledge and, frequently, little claim to respectability.

A glance at Van Helmont who was contemporary with Haydock gives us an idea of the medical thought and practice of the day. To begin with he took up medicine as a profession on the inspiration which he said he received in a dream from his guardian angel, Raphael. He was early disquieted with what he saw of medical practice, for he writes: "We know well how to dispute about every disease, but we cannot radically cure the pain of toothache or the itch". Later he rose above his disillusion and under the stimulus of developments in science joined in the attack on traditional medicine.

Whatever debt we may owe to King James for his interest in Bible scholarship, he provided no encouragement to medicine, and we can hardly blame him, for, being a walking pathological museum, he suffered grievously at the hands of his physicians. Sir Theodore Mayerne who was the ablest practitioner of the time and who set down a full account of James's health writes:

"The King laughs at medicine and holds it so cheap that he declared physicians to be of very little use and hardly necessary. He asserts the art of medicine to be supported by mere conjectures, and useless because uncertain."

Which strikes us as a pretty accurate description of the physic of the time when the men of medicine largely acted under the dubious guidance of their jealously guarded mediæval secret lore.

All these high matters were probably well outside the consciousness of Dr. Richard Haydock as he went about his practice in the peaceful

cathedral city of Salisbury under the cheering benediction of the noblest spire in England. He doubtless strolled through the lovely water meadows and along the willow-bordered river, and, as a Fellow of New College, he must have visited George Herbert at his quiet rural parsonage in the near-by village of Bemerton, and been heartened by the conversation and spirit of one of the noblest characters of the age, exceeding balm to Haydock as he remembered the stormy experience of his distant London adventure. There we may leave him, in Salisbury where if anywhere the English spirit abides.

V.

This slender story of Richard Haydock is hardly an example of what Osler called "the angelical conjunction of physic and divinity". But it does provide a theme for a homily on the vanity of human wishes. And while the vagaries of great men have often done harm in their generation, the follies of such small fry as Haydock have never harmed a human creature but have helped to furnish the infinite variety and fascination of recorded history. Haydock's case is not without later parallels. In New York in 1814 Charles Mais published a small monograph entitled *The Surprising Case of Rachel Baker, who prays and preaches in in her Sleep, with Specimens . . . taken down accurately in Short Hand at the Time*. It seems that Rachel fared better than Haydock, for she received testimonials from Dr. Valentine Mott and other eminent medical men of the time.

Montaigne has said it for all time:

"Surely, man is a wonderful, vain, divers and wavering subject: it is very hard to ground any directly-constant and uniform judgement upon him."

The seventeenth century lacked a great many things in which we today take foolish pride before the Lord, but it wrestled with the eternal verities, it eagerly probed into the natural world opening under the newly developed methods of science, and if at times it was morbid, it was not adolescent. There was an earnest, even desperate, and at times ribald concern which the modern world could well emulate, when the opposition between reason and the surging longings of the emotions is once again rising to a crest both in the medical sphere and in society at large.

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THE SURGEON-GENERAL'S INDEX CATALOGUE

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The Osler Library, like other good libraries, contains a full set of the Surgeon-General's Index Catalogue, in all its serried ranks. At one point, however, the row of large green quartos is broken by a thin little red-bound pamphlet, so trifling in appearance as to be almost ludicrous amongst such giants. But the librarian, Dr. Francis, will explain that it is so placed because Sir William Osler wanted it always there as a reminder of the beginnings of the Catalogue, and as an ocular demonstration of "what one man's enthusiasm can accomplish". For this is the printed list of what books were in the U.S. Surgeon-General's office in 1865. It was the seed from which came the fruit we now enjoy in the indispensable Catalogue, a seed which called for all the husbandry of Billings' genius. This little pamphlet contained 602 entries, comprising 2,253 volumes. Now the list alone of serial publications used in the Index Catalogue runs to 138 pages, and the total number of entries has become astronomical.

We are so accustomed to the blessings of the Index Catalogue that we are quite reconciled to the apparent incompatibility between a military organization and medical bibliography. Only apparent it is, however, for John S. Billings was far above the limitations of army organization. As a young army officer sent to work in the Surgeon-General's office he had amongst other duties to arrange and analyze field reports in preparation for the history of the war which Congress had decided to prepare. He at once seized on the fact that there were in the Department only this handful of medical books with which to work. He had never forgotten the labour his graduation thesis had cost him in consulting medical literature for which no ordered catalogue existed, much less a bibliography. So now, with the vision which has been so marvelously justified, he began to lay the foundations of one of the most remarkable monuments in history; for the Surgeon-General's Catalogue is no less. One of his first steps was to convince the army authorities of the inadequacy of its library for such a project as the war history, and this he did by producing the pitiful little list already mentioned. The history of the war duly rolled forward on its ponderous way, but long before it was completed—and forgotten—Billings was reaching out to satisfy the most bountiful acquisitiveness in literature. At first he had in mind only the bringing together of American medical literature. It would take more space than is now available to show how his design developed until no other country or organization wanted even to try to emulate it; for it eventually took in all the medical litera-

ture of all countries, and made it available to all. As Sir Humphry Rolleston said:*

"The Index-Catalogue of the library of the Surgeon-General's Office, which is beyond any comparison the most exhaustive medical bibliography ever undertaken, and the Index-Medicus (now the Quarterly Cumulative Index) have made the whole medical world, especially English-speaking readers, hopelessly insolvent debtors."

But how was this gigantic undertaking to be perpetuated? Medical writing keeps pouring out. As soon as the material for a given period has been digested into the Index Catalogue as much more again has accumulated. This has led to the publication of successive series of the Catalogue. There may have been delays in their production, but the United States Government has never failed in its support of this greatest boon to medical literature. The Fourth Series of the Catalogue has now reached its tenth volume, completing the first half of the letter M. If any excuse were needed for recalling, however briefly, the wonders of this especial wonder in medicine, this is quite good enough. The editor, Dr. Claudius Mayer, who has no appropriate opportunity of expressing his own sentiments in the matter, feels that something should be said to commemorate what he rightly calls this festival volume, since it is a decimal mark in the progress of a serial publication. In making this short comment we cannot hope to set forth fully his sense of accomplishment. We can only be grateful for the conception, execution, and perpetuation of so vast and beneficent an undertaking.

MEDICAL ECONOMICS

THE NATIONAL HEALTH PROGRAM†

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In the House of Commons, on May 14, 1948, the Prime Minister announced the decision of the Dominion Government to proceed forthwith with a National Health Program, under which large grants are to be made available to the Provinces for the improvement of health services. These grants fall under three headings: health survey grants, national health grants, and hospital construction grants.

The health survey grants are non-recurring grants amounting to 625,000 dollars, which is

to be divided among the provinces on the basis of population. "The purpose of this grant (I quote from Mr. King's address) is to assist the Provinces in setting up machinery which will be necessary to ensure the most effective use of the other health grants now being proposed, and in planning the extension of hospital accommodation, and the proper organization of hospital and medical care insurance." The Provinces will be expected to report in an approved manner on the expenditure of the funds, and on the results of the studies undertaken, but, wherein these proposals differ from those made by the Government of Canada in 1945, the health survey grants are not conditional upon the Provinces agreeing to enter a health insurance plan.

The national health grants are annual grants which will amount to 17 million dollars in the first full year of operation of the program, and will increase to 22 million dollars within a few years. They comprise: (1) A general public health grant of 4½ million dollars increasing to 6½ million dollars, which will be divided among the Provinces on the basis of population, and which is designed to strengthen the general public health services. (2) A tuberculosis control grant of 3 million dollars increasing to 4 million dollars. (3) A mental health care grant of 4 million dollars increasing to 7 million dollars. (4) A venereal disease grant of half a million dollars. (5) A crippled children's grant of half a million dollars. (6) A professional training grant of half a million dollars, to assist in the training of professional personnel in the field of public health. (7) A public health research grant of 100,000 dollars increasing to 500,000 dollars. (8) A cancer control grant of 3½ million dollars.

In order to qualify for these grants, the Provinces must agree to maintain at least their present expenditure on those services which are covered by the grants.

The hospital construction grants will amount to 13 million dollars a year for five years, and they may be continued for a second period of five years at the rate of 6½ million dollars. It is said that if these grants are fully utilized they will make possible the provision of more than 40,000 additional hospital beds in Canada. "One condition which it is proposed to attach to hospital construction grants is that the Province shall match the Dominion contribution or better it, and that the Dominion contribution shall not in any case exceed one-third of the total cost per bed in any project." (The Prime Minister).

This great national health program, providing for an additional annual expenditure of some 30 million dollars by the Departments of Health, met with the warm approval of the medical profession, particularly as we were assured that we would be taken in as full partners in the undertaking. The Honourable Paul Martin, Minister

* Sir Humphry Rolleston, Bart. The Oration commemorating the 100th anniversary of the founding of the Army Medical Library, Washington, *New Orleans Med. & Surg. J.*, 89: 333, 1937.

† Read at the Annual Meetings of the Provincial Divisions of the Canadian Medical Association, in New Brunswick, Prince Edward Island, Nova Scotia, Alberta, British Columbia, Saskatchewan and Manitoba, September and October, 1948.

of National Health and Welfare, in his radio-transmitted address to the Canadian Medical Association on June 23, had this to say:

"In thinking through the plans to expend these funds as effectively as possible, the Department of National Health and Welfare must depend, in great measure, on the considered opinion of your profession. Your ideas will influence your provincial health authorities who will have the responsibility, in the closest co-operation with the federal government of making this program work". Again Mr. Martin said: "The success of the National Health Program . . . will depend on the wholehearted co-operation and good will of your profession".

I am pleased to report, in this connection, that Mr. Martin has accepted the services of an advisory committee of the Canadian Medical Association, composed of Drs. Archer, Stock, Routley and Kelly. To date, this committee has had two meetings with Mr. Martin and his Deputy-Minister, Dr. Cameron. It is also gratifying to note that the Canadian Medical Association has sent five representatives to a conference which was held in Ottawa in November, in connection with the Federal grants.

The success of the national health program will depend on the wholehearted support of the medical profession. Can any reasonable man doubt the truth of this statement of Mr. Martin? Where, outside the group of practising doctors, is there the knowledge and experience necessary to ensure the wise expenditure of the survey and health grants, and wise planning for the future? And yet we see indications that, in some provinces, the Departments of Health intend to proceed with the national health program without our assistance and guidance. It is short-sightedness of this kind, it is this greed for power shown by some of our Ministers and Deputy-Ministers, which is alienating the practising profession from Provincial departments of health, and which may well wreck federal plans for the improvement of health services. We must urge upon recalcitrant Provincial governments that we be given our proper share of responsibility in carrying out the national health program.

While the provision of great sums of money from the federal treasury for the improvement of health services across Canada, must meet with our cordial approbation, we must take cognizance of the fact that these grants are intended to clear the ground for the development of a full measure of health insurance. The Prime Minister of Canada said, in his House of Commons speech, on May 14: "These measures also represent first stages in the development of a comprehensive health insurance plan for all Canada". The minister of National Health and Welfare, in an address delivered in Vancouver on May 18, said: "When the present program is well underway, it will then be possible to proceed with the implementation of a national plan for hospital and medical care

insurance". Later in the same speech, Mr. Martin said: "The great three-point National Health Program of the Federal Government that I have outlined does not indicate the immediate beginning of a national hospital and medical care insurance plan, but it does clear the way for that great eventuality. Since 1945 the Department of National Health and Welfare . . . has had its own officers and outside specialists working on foundation plans for the formulation of health insurance legislation".

Governmental interests in medical affairs has long since extended beyond the fields of preventive medicine, epidemiology, vital statistics and the care of indigents. We have seen a progressive expansion in the spheres of activity of our Departments of Health, an expansion which undoubtedly will be accelerated under the present national health program. We have seen them take over, almost in its entirety, the institutional care of mentally ill patients and tuberculous patients. We have seen them assume responsibility for the diagnosis and treatment of cancer and venereal diseases. Immunization of children against diphtheria, and the treatment of major communicable diseases, has largely passed from private physicians to the departments of health. Well equipped public health laboratories are scattered across the country, and there are now few fields for the private practice of clinical pathology. The Department of Veterans' Affairs has entered into civilian medical practice. Now that its splendid hospitals are incompletely filled, and its staffs of highly trained medical specialists perhaps incompletely occupied, this Department stands ready to share the burdens of private practitioners. It has expressed willingness to undertake the treatment of paraplegia and poliomyelitis, and it is showing a growing interest in the problem of arthritis among the general population. Quite recently, the D.V.A. has agreed with the British Government to arrange for the medical care in this country of United Kingdom service personnel, and their dependents, who are entitled to such care under the United Kingdom national health insurance plan.

It is quite true that in some of these activities of the Departments of Health and of the D.V.A., use is made of the services of private practitioners. It may also be quite true, and indeed I think it is, that many of these governmental policies are wise and progressive and contributory to a better standard of national health. But it is obvious that there is a slow but continuous encroachment upon private medical practice, a gradual shifting of the control of many medical services from private practitioners to governmental agencies.

Probably you all know the story, apocryphal no doubt, of the frog on the hot plate. It relates that if a frog is placed on a metal plate,

and the plate is heated very very slowly indeed, the frog at no time realizes that the temperature is rising, and though quite free to leave at any time, he is finally burnt to a crisp. The heat is on the medical plate, and many of us are beginning to feel slightly browned off.

All political parties in Canada are committed to the principle of health insurance, and it seems entirely likely that within a few years, if governmental projects are not disrupted by war, an Act providing for an all-embracing measure of compulsory health insurance will be passed by the Dominion Government, and that many if not all of the Provinces will agree to participate in the plan. I am quite confident that, if such should come to pass, both the Federal Government and the Provincial Governments will seek the advice and active co-operation of the medical profession, but I am not so sure that we will be successful in moulding the thinking of our statesmen to our own pattern.

In May, 1944, our General Council, after long debate, adopted eighteen principles relating to health insurance. Council went on record as favouring the adoption of the principle of contributory health insurance, provided the plan be fair both to the insured and to all those rendering the services. Council also committed itself to the principles that the medical profession should not be converted into a salaried service, and that health insurance should be administered by an independent non-political commission, representative of those giving and those receiving the services. I have heard it said, by wise members of our Executive Committee, that, under Government, there never has been and never will be "an independent non-political commission". Be that as it may, I am very sure that the Canadian Medical Association will not favour any plan of health insurance under which complete control of the professional lives of doctors, complete control of the conditions and terms of medical practice, is vested in a Minister of the Crown. From this distance, it seems to us that under the United Kingdom national health insurance plan, there is just this type of control of doctors and of medical practice—and yet we have the Right Honourable Aneurin Bevan, Minister of Health for England, using these words in a message to the medical profession:

"Yet it has been vital, if this is to be the new situation, to see that it did not carry with it either any discouragement of professional and scientific freedom or any unfair worsening of a doctor's material livelihood. I sincerely hope and believe we have secured these things. If we have not we can easily put that right." Later in his message Mr. Bevan said: "And I, for my part, can assure you that I shall want vigilantly to watch that your own intellectual and scientific freedom is never at risk of impairment by the background administrative framework, which has to be there for organizing purposes, but in which your own active participation is already secure." (*Brit. M. J.*, July 3, 1948.)

We cannot doubt Mr. Bevan's sincerity, but I am quite sure that our colleagues in England would be much happier if their professional freedom and security were not entirely dependent upon the vision and good will of an all-powerful Minister of Health.

The lack of enthusiasm for schemes of compulsory national health insurance, which is shown by the medical profession in England, in the United States, and, if I read my colleagues aright, in Canada, has, I think, been misinterpreted. Motives of self interest are powerful, and it is quite true that doctors fear, under any such plan, bureaucratic control, regimentation, and curtailment of professional liberty. But these things are feared, less because of their effect on the personal happiness and well-being of the doctor, than because they would lead inevitably to a deterioration in the quality of medical work, to a loss in spirit and initiative which has been responsible for dramatic advances in medical knowledge and medical skill during the past fifty, and particularly during the past twenty-five years. We fear that with state control of medicine, we will no longer attract the best types of men and women—intelligent, independent, conscientious, imbued with scientific curiosity, imbued with altruism. It may be possible indeed I think it should be possible, for an enlightened government to devise a plan of compulsory national health insurance which will not endanger the soul of medicine; but this has not yet been done in any country.

Every right-minded doctor will agree that self-supporting citizens should be enabled, indeed should be encouraged, to insure themselves and their dependents against the heavy cost of severe or prolonged illness. Every right-minded doctor will also agree that for those who are not self-supporting or are barely self-supporting, a sound basic medical service should be provided free of charge. So far we are in complete accord with the leaders of all our political parties, most of our journalists, and spokesmen for labour, agriculture and industry. But, wherein we differ from these people, we are not satisfied that a government plan of compulsory health insurance is the only way or the best way to attain these worthy objectives.

A great experiment in the provision of medical care, sponsored by the medical profession, is now under way. Non-profit, voluntary plans for the provision of prepaid medical care are showing very rapid growth in numbers and in size, both in the United States and in Canada. In the U.S.A., there were 15 such plans in 1942, and 64 in 1947, with 10 others in process of organization. In the same country, there were one and a half million subscribers to these voluntary plans on December 31, 1944, and five million subscribers on December 31,

1946. What further growth has occurred in the past eighteen months, I do not know, but I expect it has been very great, as the wave of enrolment had only started in 1946. According to a report in *Time*, the Blue Cross and the Blue Shield Plan in the U.S.A. had together, in September of this year, thirty-seven and a half million subscribers. In every Province in Canada there is now or there soon will be one or more such plans, approved by the organized medical group. These plans are being moulded in the light of experience. It can be said that they are meeting with the complete approval of a great majority of medical practitioners, and that a very rapidly increasing number of people are taking advantage of the protection which they afford. At a meeting of our General Council in June of this year, it was decided to form a federal corporation to correlate the voluntary plans across Canada, and so obviate the difficulties which now arise in dealing with the shifting population, and in making contracts with large companies whose interests are Dominion-wide.

The voluntary plans for prepaid medical care offer to every person who can afford a very reasonable monthly premium, complete or partial protection against the costs of medical services for himself and his family. The Blue Cross Plans afford him the same opportunity to insure against the cost of hospital service. In many large and small industries the necessary premiums for the workers are paid in part by employers. I have little doubt that, within five or ten years, if nothing happens to check the expansion of the voluntary plans, a very high proportion of the Canadian people will be enrolled.

It is of course quite true, and we have seen it many times in the lay press, that voluntary plans for prepaid medical and hospital care do not now offer a full solution to the problem of the provision of adequate medical care for all the people. That part of our population made up of the welfare group, and so-called self-employed people with low incomes, cannot afford the protection offered by these plans. It is here, that we should welcome government intervention. Public funds might well be used for the enrolment of these people. There is no new principle here. For many years the Ontario Government has provided a partial medical service for the welfare group, through the Ontario Medical Association. A large sum of money is provided annually, and there never has been any criticism of our expenditure of these funds or of the quality of the service which we have provided. It is at least possible that before long the Directors of the Ontario Medical Association will suggest to the Provincial Government that the responsibility for the care of the welfare group be transferred to our voluntary plan for prepaid medical care—Physicians' Services Incorporated. In May,

1947, the sub-committee on Health of the Committee on Labour and Public Welfare of the Senate of the United States, had before it an Act (S 545) known as the National Health Act 1947. This act provided, amongst other things, for the use of federal funds for the subsidizing of medical care for the low income group through the voluntary plans for prepaid medical care. While the Bill was supported strongly by representatives of the National Hospital Associations, the American Medical Association, the Council on Medical Service, and the Associated Medical Care Plans, it did not pass beyond the committee stage.

When I suggest that by providing funds for the assistance of the low income group, provincial governments might become silent partners in the plans for voluntary prepaid medical care, I express my own opinion. So far as I know, this suggestion has not been discussed in the Canadian Medical Association nor in any of our provincial divisions. I do believe that government co-operation of this kind would ensure the complete success of the plans. I do believe that if voluntary health insurance can be made available to all sections of the community, the people will be better served, and the drain on the public purse will be much less than under a compulsory national health insurance plan.

We are faced with great problems, and soon we must make fateful decisions. In mapping out our course, we should be guided by beacons which we kindled many years ago. Our Association was formed, primarily: to cultivate the science of medicine and surgery, to advance the character and honour of the medical profession, to promote the public health. If we are confronted with a plan of health insurance which will in any way impede the practice of scientific medicine, the march of medical research or the education of our undergraduate and postgraduate students—we must oppose it. If the plan will affect adversely the independence, the dignity or the economic status of practitioners of medicine—we must oppose it. If the plan fails to facilitate the provision of adequate medical service for all the people—we must oppose it. Conversely, if a plan of health insurance is such that medical science and medical research will be fostered, if it is such that the professional and personal interests of the doctors will be safeguarded, and if it is such that we will be enabled to bring to poor and rich alike the best which medical science has to offer—then in wisdom and in honour we may lend it our full support.

The successful use of sulfonamide drugs for X-disease on peaches is an example of the new trend toward "artificial immunization" of plants against diseases.

CANADA'S NATIONAL HEALTH PROGRAM*

Hon. Paul Martin

Minister of National Health and Welfare,
Ottawa, Ont.

I. THE DOCTOR'S PLACE IN FEDERAL HEALTH PLANS

The new National Health program has been acclaimed in all parts of Canada. Provincial governments, Canadian health leaders, the average Canadian citizen—all recognize in this program an historic advance towards good health. . . . Tonight, at this annual meeting of the Royal College of Physicians and Surgeons of Canada, I take the opportunity of making the first progress report on this plan. No one could have a greater stake in health than you who have crowned years of medical training with intensive instruction before taking positions of special trust in the life of your country and community. As leaders in the medical profession you must always be aware of every important health development and active in its support.

Canada's health services rest firmly on the foundations that you have laid. Government action cannot supplant your enthusiasm or your effectiveness. The first essential of any government health program is to strengthen the hands of those most immediately responsible for health leadership. My talk tonight is about our tremendously significant federal health plan, but, through each of its members, the Royal College represents more than 3,100 important individual health programs.

The first point in my progress report is to note that the new national plan does not in any way lessen the rôle or lighten the responsibilities of the individual doctor, dentist, nurse or health worker. In bringing better health to its citizens, a government must look to your profession for leadership. Without your confidence and collaboration, no health program could be fully successful. I can assure you that no action taken by the present Government under this or under any other program to improve health services in Canada will stifle or destroy the liberty of the individual doctor. All of us in our own respective fields must, of course, recognize our social responsibilities in the service of society, whether we be public servants, or professional persons in the larger areas of service to humanity. We must adjust our disciplines, our patterns of performance in recognition of this growing sense of social responsibility. Yet this must be accomplished without restriction of our liberty and freedom. Health advances take their

inspiration from the imagination, industry and integrity of each member of your profession. Regimentation of the doctor would be ruinous to health progress. In any sensible plan the doctor holds a responsible position. Will we not want to see that doctors should continue to be free to serve their patients—not that they should become mere servants of the state?

II. THE PROVINCES AND THE FEDERAL PROGRAM

The second point in my progress report is that the National Health program does not lessen the momentum of provincial health services. Our program for health must start with the individual citizen. In taking account of all his working and living conditions, health planning can best be done on a local or regional basis. Except for long established federal health services—such as the inspection of food and drugs, quarantine, and health care for sick mariners and Indians—it would be folly to attempt to administer from Ottawa all Canada's far-flung health activities.

While health is a national concern it is primarily a provincial responsibility.—And rightly so. Our health services are soundly established in each province; as they are based in large part on local need and related to local conditions they should be administered locally and provincially. This is as sound as it is sensible. Health administration in Canada is a vastly complex interlocking system of the multiple activities of voluntary health agencies and of the municipal, provincial and federal governments.

If, in trying for an illusionary efficiency, we pressed for an overall central administration, we could only confuse the health picture. Such centralization would badly serve the Canadian citizen. Our federal plan does not disturb the proper Dominion-Provincial balance of health services. It does not attempt to do ponderously for the province what they can do efficiently for themselves. There are, however, important health duties incumbent on every government in Canada. Through the Department that I have the honour to administer, the Federal Government has a clear responsibility—apart from its own health services—to co-operate with provincial authorities in the co-ordination of efforts to improve the public health of Canada. In recognition and in discharge of this responsibility, the National Health program was inaugurated.

III. THE PROGRAM IN OUTLINE

Before going into detail of results achieved, I shall review the major objectives of this program and the provisions made to reach them:

1. Comprehensive and searching surveys are to be made of the Canadian health scene. Each province is given financial assistance to make a close study of its

* The main points of an address at the annual dinner of the Royal College of Physicians and Surgeons of Canada, Ottawa, November 27, 1948.

health services and of its hospital needs, and to formulate its health plans for the future. For this purpose, federal grants totalling \$625,000 have been provided.

2. Provincial health services are to be strengthened and extended. New developments are to be encouraged. There will be concerted campaigns to widen the range of preventive medicine and to cure disease. Federal grants starting at \$16,500,000 and rising to \$22,000,000 will be available each year for public health research, for public health projects, to train professional health workers, to help crippled children, to fight venereal disease, to control tuberculosis and cancer, and to manage mental illness.

3. Great increases in hospital accommodation are to be encouraged by annual grants to the provinces, totalling \$13,000,000 a year. In order to provide a powerful incentive towards building 40,000 badly needed hospital beds, the Government will pay up to \$65,000,000 over a period of five years, at the rate of either \$1,000 or \$1,500 for each bed, on condition that the provinces match these grants.

In recent years the Federal Government has widely surveyed the Canadian health scene. Everywhere it found evidence of real achievement. The provinces have been doing admirable work, increasing their health services and hospital facilities, but it was seen that, if the pace of their health progress was to be accelerated and neglected areas cared for, federal financial aid was essential.

IV. PROGRESS REPORT ON NATIONAL HEALTH

It is only six months since this program got underway, but already there is every evidence that it is succeeding admirably in its main purpose—to raise the entire level of health activity in Canada. From every province plans and projects are coming into Ottawa. It is an inspiration to receive, from all parts of Canada, details of projects that reflect the imagination and initiative of provincial health departments, eager to take full advantage of this federal assistance to expand their present services and to strike out in new directions.

From the projects coming to us it is evident that each province is carefully reviewing its health operations, while searching out and training personnel for the new activities planned. New equipment is being sought, administrative machinery is being expanded; weak points in provincial programs are being searched out and corrected. Neglected territory is being brought within the orbit of these new health plans.

It takes time to assess and strengthen provincial programs and this might prevent full and immediate use of the monies available. When I asked Parliament to approve the whole amount for this fiscal year I did so for a special purpose—to indicate how anxious the Government was to see its grants fully utilized this year if possible. This year's allotment of \$30,000,000 is our target figure—the amount of money that we believe should be expended to bring our health services up to desirable levels. While all of the health survey grant and much of the national health grant monies will be ex-

pended in this fiscal year, it seems possible that some provinces will be unable to use all of their hospital construction grants. So, to achieve the results desired, the Government will carry over the unexpended portion of the hospital construction grants to make a total of \$65,000,000 available by 1953 to increase hospital accommodation.

(a) *Health survey grants.*—First of all, it is encouraging to see the energy that is being put into the provincial health surveys. Planning shows the way to health progress. At a three-day conference held in Ottawa in November, the directors of all these survey groups showed a determination to get at the facts about their health services and hospital facilities and to search out remediable conditions. They were assisted by the newly-formed national consultative committee, made up of representatives of the principal national professional associations. In every province, health services and hospital accommodation are being reassessed and related to present and future needs, especially in view of the federal support now at hand. The national health program was based on the best information and the best advice available but the provincial health surveys will provide an additional mass of accurate and useful information from which further health advances can be more easily planned.

(b) *Hospital construction grants.*—The necessity of completing preliminary surveys of their needs has, until recently, prevented some of the provinces from putting forward their programs for hospital construction grants, but Nova Scotia, New Brunswick and Manitoba have made important requests for federal aid. These are now under consideration. I am expecting submissions from Ontario and Quebec. In spite of the difficulties that delay construction work of any sort in Canada, great importance is attached to helping the provinces increase their hospital accommodation by 40,000 beds in the next five years. We will encourage every province that finds it impossible to utilize its full grant in the first year to expand its building program in subsequent years to use the available federal grant—that can be carried over each year—in order to build the accommodation so urgently needed.

(c) *National health grants.*—There can be little doubt that even in the few months that have passed notable advances have been initiated through the National Health grants. In reviewing each grant I shall attempt to illustrate by typical examples—chosen from scores of projects—the sort of activities that are now under way.

1. *To underwrite research in public health.*—In the present year, \$100,000 has been set aside for research in public health in addition to the funds provided through the National Research Council. Projects are shaping up to make good use of this money. As research facilities and trained personnel are augmented, this grant will rise to \$500,000 annually. The need for research is fully recognized throughout the

federal program, for research is an essential part of any forward-looking health plan.

2. *To train professional health workers.*—As provincial programs expand, personnel must be trained to staff them. For this purpose, there is, in addition to training provided under other grants, an annual federal grant of \$500,000 a year. Already, in several provinces, projects have been approved that will train more than 250 people in health work. These cover a great variety of avocations, from laboratory technicians to medical specialists. Sanitary inspectors, public health engineers, public health nurses, dentists, doctors, veterinarians—all are included in current projects.

3. *Better care for crippled children.*—In Canada there are perhaps 50,000 crippled children. As soon as new programs can be developed, the federal grant of \$500,000 annually can be translated into preventive work to discover conditions that, if neglected, would lead to crippling. More adequate treatment will become available for those already crippled, and rehabilitation services will be provided on a larger scale.

4. *More active control of venereal disease.*—By more than doubling the existing federal grant for the control of venereal disease, the Federal Government has made increased control possible. Established programs for education, for the provision of drugs and for follow-up services are being continued. Part of the increased grant is being used in Manitoba and British Columbia for penicillin. In Prince Edward Island, blood tests will be made of every person admitted to hospital. In Alberta, a new clinic is being established at Lethbridge, and a mobile clinic is being sent into the northern part of the province. In general, this increased grant is widening the reach of skilled treatment and extending to clinics and private physicians expert instruction in new treatment techniques.

5. *Increased efforts to eradicate tuberculosis.*—The death rate for tuberculosis in Canada has declined strikingly, but this disease still represents a major national health problem. More than 4,000,000 patient-days a year are expended in tuberculosis institutions alone. As its causes are known and as cures are possible in most instances when it is discovered in time, the federal grant of from \$3,000,000 to \$4,000,000 a year should yield impressive results in the fight against tuberculosis.

Projects that have been approved under the Health Plan include the distribution of streptomycin in five provinces. New equipment is to be provided in several provinces in very considerable amounts. Ontario hospitals will be equipped and assisted to give routine chest x-rays to all admitted, and Ontario's chest clinics are being expanded to cover its entire population. In British Columbia, a pool of x-ray survey equipment is being built up for

the use of all general hospitals, and eleven new tuberculous control units are being formed. In Alberta, free sanatorium treatment will be made available for non-pulmonary types of tuberculosis, making treatment for any form of this disease free in that province. New Brunswick has come forward with a variety of projects that fully utilize its grant of \$142,000 this year for tuberculosis control. These are some—but by no means all—of the fundamental and far-reaching steps being taken as a result of the Federal Government's Health Plan.

6. *Acceleration of campaigns against cancer.*—Important steps have been taken to accelerate our campaign against cancer. Nearly two years ago, I met with representative leaders in the medical and other fields to assist in forming the National Cancer Institute of Canada, which has already launched 43 significant research projects. I expect all of the provinces will agree to assign a percentage of their cancer control grant to support research under the Institute. Our hope is that if Canada in common with other countries puts enough energy into the study of cancer, in good time more of its secrets can be discovered. Large-scale projects are now being put forward to utilize the annual \$3,500,000 cancer control grant. Prince Edward Island has received approval for the organization and operation of two diagnostic cancer clinics. A doctor is to be given special training before becoming director of a cancer control division. Free cancer laboratory services are to be made available. New Brunswick is purchasing cancer therapy equipment for five new cancer treatment centres, and also purchasing a supply of radium. It is setting up six cancer diagnostic clinics. There are important cancer control projects for Manitoba and Quebec. Other provinces are preparing projects in cancer control under this national health plan that will have very far-reaching effects.

7. *Management of mental illness.*—Another major health problem is the prevalence of mental illness. At the beginning of January, 1948, there were 54,667 patients in mental institutions in Canada—nearly half the total number of people in all Canadian hospitals. A federal grant rising in stages from \$4,000,000 to \$7,000,000 a year has been provided to fight this disease, especially by preventive measures. This federal expenditure should bring about important changes. Expert mental health care should extend beyond the mental hospital to become a living part of medical care in the general hospital and more easily available to the average citizen in his own community. For example, the federal plan makes possible a travelling mental health clinic in Prince Edward Island as part of a proposed mental health division. In Ontario, a large-scale program is underway at the University of Toronto to give special training in mental health to psychiatrists, physicians, psychologists, psy-

chiatric social workers, nurses, and teachers in psychiatry and public health. In Manitoba, extensive work in occupational therapy is being developed in mental hospitals. In Saskatchewan, three teacher-psychologists are to be trained to act as liaison officers between mental health clinics, the school and the community. Part of this training is made possible by the professional training grant.

The mental health grant is bringing more expert psychiatric knowledge to the patients in mental hospitals. Hospital staffs are being strengthened and given additional training. The equipment and facilities of mental hospitals are being improved. Because of this federal aid, more attention can now be given to prevention in mental illness work and to treatment and rehabilitation.

8. *Extension of activities in public health.*—In the present year, \$4,400,000 is being provided for provincial work in general public health. This grant will increase until it reaches \$6,500,000 a year and then continue on the basis of 50 cents per capita yearly. This grant is helping to expand existing public health facilities, and to put much greater emphasis on preventive medicine. For instance in Prince Edward Island, branch laboratory services are being provided in the provincial and general hospitals. In New Brunswick, an integrated program of public health education and preventive dental hygiene is provided for. Saskatchewan has also established a division of dental hygiene. Bacteriological services in Regina are being improved and extended and the city's health services strengthened. In Alberta, a new health unit is to be set up to serve Drumheller and district.

British Columbia has already utilized 60% of its public health grant of \$365,000. Public health education is being extended. A division of preventive dentistry is being established. Special equipment is being provided to extend the facilities and services of local health units. To build new units, to expand the staff of those already in existence, and to expand public health nursing services, 15 additional nurses and 14 sanitary inspectors will be added to health unit personnel in British Columbia. . . .

V. IMPORTANCE OF PREVENTIVE MEDICINE

I have made this broad survey of typical projects to show what has been accomplished thus far under the federal plan and to keep you advised of the progress that is being made. I have not attempted to relate these new developments to your particular interests, although many of the projects outlined will mean much to you personally since you will help to bring them to fulfilment. The Fellows of the Royal College of Physicians and Surgeons, who lead in specialized fields of medicine will, I know, give intelligent guidance to medical training to keep it abreast of modern developments and

current need. I hope that the new directions and new opportunities given to health action in Canada by this program will receive full consideration in medical teaching. I believe that the general practitioner—the “family doctor”—would like to play a greater part in public health work. If so, the first encouragement of this interest would be to put more emphasis in medical instruction on preventive medicine and public health generally.

It should be your concern, as leaders in Canadian medicine, above all else to guard against any action, whether it be by private agencies or by government, that would lower the standard of medical practice. All our health programs would fail if the intangibles of medical progress—the quality of medical training, the doctor's instinct for selfless service—should in any degree be allowed to deteriorate.

For those who, like myself, serve this nation in a public capacity, there is a clear duty to see that the nation's health receives the attention and the financial support it deserves. For everyone who, like the Fellows of this College, serve the cause of better health, there is an equally heavy responsibility to support each progressive movement to bring health services to all Canadians who need them, regardless of their ability to pay. . . .

This program represents, I believe, an important milestone in our attitude towards health care in this country. *It emphasizes that this is the era of preventive medicine.* I look forward to increased co-operation and unity of outlook between all who serve the cause of health, for all have a common objective—to achieve better levels of health for every Canadian.

ASSOCIATION NOTES

Historical Notes on Saskatoon

Saskatoon, to be the home of the forth-coming annual convention of the Canadian Medical Association is located on the banks of the south Saskatchewan River and much of its beauty is derived from this situation. To quote from Archer and Bates “Historic Saskatoon”.

“The South Saskatchewan, wide and muddy, flows on as steadily as time. This river is the particular pride of the citizens of Saskatoon. It is part of their lives. It signals the advent of spring; it marks the onset of winter. There is an air of timelessness and inevitability about it. Come frost or heat, drought or flood, the river never ceases to flow. It has run a winding course for 700 miles before sweeping around the banks of Saskatoon and for 100 miles more it will roll through prairie and park land before it joins the North Saskatchewan. Together the combined waters will flow yet another 300 miles to Lake Winnipeg. In the history of this river the story of Saskatoon is a recent but an exciting chapter.

"Yet the South Saskatoon is not an old river in the geological sense nor has it always flowed in its present channel. It was born during the passing of the last great ice sheet which covered much of this continent some 30,000 years ago. As the ice-mass melted and retreated northward great lakes formed between the ice front and the higher ground which had been bared. In general the land slopes down to the north and east, hence the lakes which formed drained through the Souris Valley. As the ice front retreated farther north the course of the river ran for a time through the Qu'Appelle Valley, still later through the Blackstrap Channel, and finally, as the ice receded north of Saskatoon, the South Saskatchewan flowed in its present course.

"Up from the river and back into the horizons stretches the prairie land, the firm basis of the city's well-being. Saskatoon is situated in the marginal wheat land belt. To the north, past Warman, lies a black soil zone fertile and easily worked; to the south, near Dundurn, a light and more sandy soil makes grain farming a less profitable undertaking. The lake bottom region in the Sutherland district, and the rich loamy soil north toward the old Factoria townsite, are very fertile.

"The natural vegetation of the Saskatoon area is typical of the mixed prairie belt. In this area the blue grama grass, common spear grass, and the blue-jointed grass grow taller than in the drier short-grass area farther to the southwest. Northern wheat grass, rough fescue, and wild roses grow in profusion. Willow and aspen bluffs are a common sight.

"Through the region flows the river, the moving force of the landscape. Shifting sand bars and rapid, treacherous currents have earned it the name Saskatchewan—'rapid river' or 'swift current'. Voyageurs and fur-traders have toiled their arduous way up its length. Steamboats have come and gone over its broad course. Through it all in break-up and freeze-up, year in and year out, the river has flowed on. Man, the newcomer, has sought to turn its beauty and its strength to his own advantage."

Saskatoon itself was founded as a result of the activities of an Ontario company, The

Temperance Colonization Company, who acquired from the Dominion Government in 1882 a block of 2,000,000 acres of land lying across the South Saskatchewan. When the tract had been surveyed it was decided that the present site of the city was the most suitable for an administration centre and it was established there. Various names were proposed but as one of the party had brought in a branch covered with red berries and it was learned that the Indians called them Saskatoons, (Mis-sask-quah-too-min (a)—carpet of flowers), it was decided that Saskatoon should be the name of the new settlement.

The founding was officially celebrated on August 18, 1883. At that time the lumber for construction was brought by river from Medicine Hat. By the following year mail and telegraphic services were established, a local ferry made Saskatoon the crossing place on the trail from Regina to Battleford, and a steamboat, the *May Queen*, was plying the river.

Saskatoon's first hospital was established in the following year when subsequent to the outbreak of the North-West Rebellion, General Middleton ordered its formation. Deputy Surgeon-General Roddick requisitioned three houses and Nurse Miller of Winnipeg took charge of the nursing services. In this modest way was inaugurated the military nursing services which were to become so important in 1914-18 and 1939-45.

(To be continued)



General View of Saskatoon

Star-Phoenix Photo, Saskatoon, Sask.

ACCOMMODATION AT SASKATOON

All arrangements for the housing of members who plan to attend the 80th Annual Meeting in Saskatoon, June 13 to 17, are in the hands of the local Committee on Housing. In the January issue of the *Journal* the available accommodation was described and an application form was outlined. It is by no means too early to make plans for accommodation at Saskatoon and all requests for reservations should be addressed to:

The Committee on Housing,
Canadian Medical Association,
Saskatchewan Division,
415 Birks Bldg., Saskatoon, Sask.

Scientific Exhibits at the Annual Meeting

Ample space has been provided at the University of Saskatchewan for scientific exhibits in connection with the Annual Meeting, Saskatoon, June 13 to 17. Members having material for display should obtain applications and regulations from:

Dr. D. F. Moore, Chairman,
Committee on Scientific Exhibit,
St. Paul's Hospital, Saskatoon, Sask.

Affiliated Societies at the Annual Meeting

Monday and Tuesday, June 13 and 14, are available for meetings of affiliated societies at Saskatoon. Meeting room facilities will be allotted on application and officers desiring to arrange meetings are asked to communicate with the

General Secretary, C.M.A.,
135 St. Clair Ave. West,
Toronto 5, Ontario.

THE NATIONAL HEALTH GRANTS PROGRESS IN THE MARITIMES

A. D. Kelly, M.D.

Assistant Secretary, Toronto, Ont.

In common with the profession throughout Canada, the Maritime Divisions of the Canadian Medical Association made early offers of assistance to their respective Provincial Governments in respect of the Health Grants made available by the Government of Canada. It is gratifying to report that in each instance these offers were accepted and that representatives of the medical profession are full partners in the studies which are proceeding under the Health Survey Grant. This is as it should be. No other group can bring to bear on the full range of planning for the extension of health services, the knowledge and experience possessed by practising doctors. Our colleagues of the Maritime Divisions are also aware that representation in itself is not enough. No single individual can claim experience which

permits him to speak with authority on the many subjects which constitute the Health Grants or on all of the ramifications of a serious study of health needs and resources. To support and inform and consult with their spokesmen, the Divisions have established sub-committees, each charged with the detailed study of one aspect of the Health Grants, from tuberculosis control to hospitalization.

The stage has been set in the Maritimes, and in each of the three provinces committees are at work. Their long-term function is to assess the health needs of the people of their provinces and to make plans and recommendations to improve services. The actual availability of large sums of money in the form of the Federal Health Grants, however, imposes the immediate duty of recommending the wisest expenditure in a fashion which will contribute to the ultimate plan which will be developed. These two functions increase the difficulties of planning, but it is important that they should be carried out by the same group if proper co-ordination is to be achieved. The view has frequently been expressed that it would have been preferable if the resources of the Health Survey Grant had been available at least a year in advance of the remaining grants. This would have permitted a more detailed study of the problems without the pressure of expiry dates of non-accumulative grants. However, this method of approach was not afforded and the grants are made available at once under the terms of ten separate Orders-in-Council.

It is becoming increasingly evident that, in planning new health services and extensions of existing services, a first requirement will be suitably trained personnel. As these individuals are not readily available it has been necessary to select persons with suitable backgrounds and to arrange for their further education, frequently at centres remote from their home province. As a first charge against certain grants, appropriations are being made for the training of radiotherapists, psychiatrists, public health nurses, psychiatric social workers, laboratory technologists, sanitary inspectors and a host of other workers in the field of health. The implementation of several programs under the health grants must necessarily await the return of these trainees and the full effect of the grants will not be apparent for at least two years in certain instances.

In Prince Edward Island the Provincial Health Planning Commission is a fully representative body of nine persons, two of whom, Dr. W. J. P. MacMillan and Dr. W. B. Howatt, are appointed by the Island Division. Here very substantial progress in planning and in the utilization of their share of the Health Grants has been made. A survey of nursing problems has been carried out. A cancer diagnostic service has been established. Plans have been made for the establishment of clini-

cal and public health laboratory services at regional hospitals and the necessary equipment has been purchased. A study of the Island's need for increased hospital accommodation is proceeding, and on the basis of a master plan, the Hospital Construction Grant will be expended. Equipment for occupational recreational therapy at the Island's Mental Hospital is being obtained. Plans are being made for an extension of the program of aid to crippled children.

In New Brunswick the approach to planning under the National Health Grants was initially made by convening a conference of all agencies and organizations interested in health matters. A group of some forty representatives heard and debated the possibilities of extending health services. While this conference was valuable in disseminating information it was quickly evident that the details of planning must necessarily be entrusted to a much smaller group and an Executive of five persons was selected for this purpose. Miss Ruth Wilson, Managing Director of Maritime Blue Cross, was appointed chairman, and the New Brunswick Division confirmed the appointment of Dr. A. F. VanWart and Dr. C. L. Gass as representatives of the medical profession. The remaining two members, Dr. A. M. Clarke and Mr. Jean Garneau, are officials of the Department of Health. The planning group has been too recently organized to report progress, but they propose to seek the services of experts in the technique of surveys to establish the pattern for their task. As a result of recommendations of the New Brunswick Division, diagnostic facilities for cancer patients have been set up at eight hospitals in the province. Arrangements for treatment have not yet been fully organized, but it is proposed to provide for surgery and radiotherapy at designated centres and to afford treatment services at the public expense. The training of personnel for an expanding program in Mental Hygiene, Cancer Control and General Public Health is proceeding with the financial assistance of the appropriate Health Grants.

In Nova Scotia, the untimely death of the Honourable Dr. F. R. Davis, late Minister of Public Health, has given rise to some delay in arrangements for planning. Dr. Davis was thoroughly familiar with the details of the Health Grants and, realizing their importance to the medical profession, had requested the Nova Scotia Division to appoint an Advisory Committee to him. The present organization relative to the Health Grants consists of two committees: (a) A Central Committee of officers of the Department of Health, and (b) An Advisory Committee consisting of representatives from Medicine, Hospitals, Nurses, Labour, etc. Both of these groups advise the new Minister, the Honourable L. D. Currie, K.C., on projects under the Health Grants, and will

undertake a study of health needs under the Health Survey Grant. Dr. Norman L. Gosse has been appointed by the Nova Scotia Division to represent the medical profession on the Advisory Committee and arrangements have been made for the appointment by the Division of study committees on specific grants.

Good progress has been made by our Maritime colleagues in bringing to bear medical opinion on the important health topics of today and tomorrow. The official relationship of the Division to their respective governments has been soundly established and the potentialities for improved health services to the people are great. The interest of individual practitioners, however, requires to be mobilized, not only here but everywhere in Canada. Every doctor will be affected by the National Health Grants. He should inform himself on their possibilities and their limitations, and be prepared to advise his Divisional representative on projects which concern his patients and his professional work.

Payment of Interns

The following extract is taken from the minutes of the meeting of General Council held in Toronto in June, 1948.

"Mr. Hines, a representative of CAMSI, stressed the importance of some remuneration being made to interns serving in hospitals, pointing out that many students will not find it possible to spend as much time as they should in interning unless some financial assistance is available.

Moved by Dr. Morgan, seconded by Dr. Wilson,

THAT Council go on record as approving the reasonableness of CAMSI's request that graduate interns at teaching hospitals be paid \$25.00 per month.

Carried"

THE CAMSI COLUMN

CAMSI Summer Job Service

The growing need for more doctors in general practice plus the growing tendency for the bulk of medical students to either specialize or enter the research field were the prime movers in the establishment, last year, of the CAMSI Summer Job Service. The main objects of this service were two-fold. First, to supply clinical year students with an opportunity to spend a summer with a practising physician and thus gain valuable experience which is not adequately covered by internship. Secondly, it was hoped to show the students the true status of the general practitioner—not a day-in, day-out "slugging" job but rather an exciting adventure in living.

As with all new projects, the summer job service had growing pains. The response from the medical profession was excellent but the project was not started in time and the job lists came out too late to be of use to many students. This year, we are attempting to start our project earlier so as to make the service available to an increasing number of medical students. Reports from both physicians and students who were involved in last year's service have been very encouraging, enough so to convince CAMSI executive that the summer job service

has great possibilities. In addition, we are attempting this year to procure jobs for the junior year students, jobs which will be of a medical nature and which will assure them a reasonable income for a few summers, enough to carry them through a summer with a physician. This financial obstacle is one of the major hurdles to be overcome at present. For although students realize that the experience is invaluable, perhaps more medical students than ever before are very dependent on their summer earnings to carry them through the following year.

The student and doctor are both in agreement that the actual services rendered are worth little or nothing from a strictly financial point of view. The honorarium which is usually given to the student probably stems from the physician's memories of his own passage through medicine. There are, however, things which cannot be bought and the chats in the evening about cases and practical medicine, the maturing of the student through even a few months' contact with age and experience, and perhaps the rejuvenation of the doctor through intimate contact with youth and enthusiasm, are things beyond price.

On the other hand, CAMSI has undertaken a project and should assume responsibility for making it work. It is felt by the National Executive that the logical way to accomplish the desired end is to provide a complete employment service for students of all years. In this way the executive feels that confidence in the CAMSI Summer Job Service will be developed and that students will thus turn unhesitatingly to CAMSI for future employment.

This is a students' project and it is up to us to make it a thing of value to all students. We do need help, a great deal of help. It is to hospitals, laboratories and above all to the family doctors that we turn.

GRAHAM BEATY,
Nat. Dir. Public Relations, CAMSI.

EDITOR'S NOTE.—The Summer Job Service outlined above will recommend itself to many of our members. If you are prepared to assist by acting as preceptor to a senior student during the summer vacation in 1949, please communicate with: Mr. Don Swartz, Secretary, CAMSI, c/o Faculty of Medicine, University of Western Ontario, London, Ontario.

In your first letter, please state time, remuneration and living arrangements.

MEDICAL SOCIETIES

Congress of the International Society of Hæmatology

The first formal Congress of the International Society of Hæmatology was held in Buffalo, N.Y., from August 23 through August 26, 1948. There was an attendance of 740. This Society is an outgrowth of the International Rh and Hæmatology Conference which was held in both Dallas, Texas, and Mexico City, November 15 to 23, 1946. The inspiration received from the free exchange of scientific information during those sessions led the conferees to believe that an international organization for hæmatology in its broad interpretation was desirable. A truly International Society was organized and Buffalo was selected as the convention city for 1948.

During the four days of the congress, 38 papers were presented on the various phases of the field of hæmatology. The first day of the congress was devoted to the problems of blood coagulation and hæmorrhagic diseases. The second day of presentations was concerned with anæmias, iron metabolism, folic acid and stable isotopes. This was followed by presentations and discussions on cellular morphology, radioactive isotopes, and leukæmia on the third day. The fourth and final was devoted to immuno-hæma-

tology and blood transfusion. In addition, forty scientific exhibits of research work in the broad field of hæmatology were on display in the Scientific Exhibition Hall. These exhibits varied from the genetics of inherited anæmias to studies on the hæmatopoietic organs in blood dyscrasias. This wealth of significant material kept the auditorium and exhibition rooms filled with attendants actively interested in discussions and exchanging information. Scientific motion picture films and tours completed the program. Relaxation and entertainment were provided by a trip to the Canadian side of Niagara Falls, dinners, receptions and the final banquet. This gave the members an adequate opportunity to become acquainted with each other and renew old friendships.

During the business sessions at Buffalo, the Constitution and By-Laws of the Society were adopted. The purpose of the Society is: (1) "to promote and foster the exchange and diffusion of information and ideas relating to blood and blood forming tissues throughout the world; (2) to provide a forum for discussion of hæmatologic problems on an international scale; (3) to encourage scientific investigation of hæmatologic problems; (4) to promote the advancement of hæmatology and its recognition as a branch of the biological sciences; (5) to attempt to standardize on an international scale hæmatologic methods and nomenclature; (6) to promote a better understanding of the scientific basic principles of hæmatology among practitioners of hæmatology and physicians in general and to foster better understanding of and greater interest in clinical hæmatologic problems among scientific investigators in the field of hæmatology."

The membership is composed of three classes, Fellows, Honorary Fellows and Emeritus members. Those eligible for Fellow membership shall be any person who has manifested a continuous interest in hæmatology for a period of five years as evidenced by original contributions, attendance at hæmatological meetings, teaching and writing on hæmatological subjects. They must be medically qualified or hold an earned doctor's degree or its equivalent in science.

The Fellows of each nation have or will elect their own Councillors. Following the business session of the Society a meeting of the Canadians was held, at which Professor Theo. R. Waugh, McGill University, Montreal, was chosen Councillor for Canada.

L'Association des Médecins de l'Est

L'Association des Médecins de l'Est, dont le but est l'étude des questions de déontologie et d'intérêt professionnel, a procédé, le 30 novembre 1948, à l'élection de son exécutif pour 1949 avec le résultat suivant: Président, Dr Paul Letondal; Vice-présidents, Drs René Dionne, Gérard Rivard et Viateur Archambault; Secrétaire, Dr Julien Pesant; Trésorier, Dr René Major; Directeurs, Drs L. A. Hébert (président sortant de charge), Léon Ledoux, J. E. Limoges, Gaspard Morin et Origène Dufresne. Cette Association tend à développer l'union et l'entraide chez les praticiens de l'Est de Montréal, partie de la métropole constituée presque exclusivement de Canadiens-français, qui a pris depuis quelques années un essor considérable. L'Association cherche également à améliorer les conditions de la pratique médicale et la situation sociale du médecin par la discussion des problèmes d'actualité. Le Secrétariat est situé à 2043, rue Champlain, Montréal.

Société de Gastro-entérologie de Montréal

Lors de la dernière séance de la Société de Gastro-entérologie de Montréal, tenue au Cercle Universitaire, vendredi le 17 décembre 1948, l'on procéda à l'élection des membres de l'Exécutif pour 1949 avec les résultats suivants: Président, Dr René Rolland; 1er vice-président, Dr Yves Chaput; 2ème vice-président, Dr Paul Letondal;

secrétaire, Dr Jean-Louis Léger; trésorier, Dr Roland Gareau; conseillers, Drs Antonio Cantero, Roger R. Dufresne et Albert Jutras (anciens présidents). Au cours de cette réunion, le Dr Jean Burekel présenta un travail sur les dilatations veineuses de l'estomac et le Dr Daniel Prot une communication sur la pharmacodynamie du duodénum. A cette occasion, les Drs Burekel et Prot furent élus membres correspondants-étrangers de la Société. On sait que ces deux médecins français font actuellement un stage dans nos hôpitaux au Canada.

Fondation de la Société de Pédiatrie de Montréal

Il y a maintenant un an que se fondait, le 19 janvier 1948, la Société de Pédiatrie de Montréal. Incorporée le 19 mars de la même année, cette nouvelle société a fonctionné régulièrement depuis sa fondation et a tenu ses séances, le 1er jeudi de chaque mois, au Cercle Universitaire. Son but est de grouper les pédiatres de langue française de Montréal et des environs pour l'étude de la pédiatrie et des questions dites d'intérêt professionnel. Son Exécutif actuel est composé des Drs Albert Guilbeault, président; Raymond Labrecque, vice-président; Paul Letondal, secrétaire-trésorier. Ceux qui seraient intéressés à en faire partie sont priés de communiquer avec le secrétariat à 370 est, rue Roy, Montréal 18.

Séance du 9 décembre 1948.

Malformation des voies urinaires chez un nourrisson.—M. Norbert Vézina.

M. Vézina rapporte l'observation d'un nourrisson de 2½ mois, chez lequel il a pu faire le diagnostic de malformation des voies urinaires pendant la vie, grâce à la radiographie après injection de substance opaque par sonde urétrale. Il s'agissait d'un enfant qui, depuis la naissance, avait des symptômes digestifs (vomissements, diarrhée) et n'engraissait pas. Aucun trouble fonctionnel au point de vue urinaire, mais présence d'une masse dans la région hypogastrique, avec abdomen tendu, douloureux à la palpation. Il semble donc qu'il soit possible, dans la première enfance, de faire le diagnostic de malformation des voies urinaires pendant la vie. N'y aurait-il pas intérêt à reconnaître plus précocement ces obstructions mécaniques, avant la période de distension des uretères et des bassins, et de destruction du parenchyme rénal, de manière à augmenter les chances de survie de ces enfants?

Traitement de l'infection dans les diarrhées du premier âge.—M. Gilles Huard.

M. Huard limite son travail à la lutte contre l'infection dans les diarrhées infantiles. Il divise les diarrhées du premier âge en: (1) dyspepsies gastro-intestinales, avec ou sans infection parentérale; (2) entérites véritables, d'origine infectieuse. Dans le traitement du premier groupe, le rapporteur insiste sur le rôle de l'infection parentérale. Il étudie successivement, dans ces cas, les indications et le mode d'emploi des sulfamidés, de la pénicilline et de la streptomycine. Lorsque la dyspepsie gastro-intestinale revêt la forme toxique, le traitement de l'infection ne suffit pas; il faut un régime alimentaire spécial, des injections à doses massives de sérums artificiels.

Pour traiter avec succès les entérites infectieuses, on doit procéder à une culture des selles et se baser sur les résultats du laboratoire pour poser les indications thérapeutiques. La diversité des agents microbiens exige, tantôt l'emploi des sulfamidés, tantôt celui de la streptomycine. Dans les deux groupes de diarrhées, la transfusion sanguine, lorsqu'elle est indiquée, rend de précieux services et améliore considérablement le pronostic.

Les Convulsions Infantiles.—M. Gérard Joncas.

M. Joncas attire l'attention sur quelques travaux récents publiés aux Etats-Unis concernant les convulsions infantiles. Le diagnostic des convulsions doit d'abord être un diagnostic clinique. Dans tous les cas, un examen complet du malade s'impose. Chaque fois que cela sera possible, on fera un dosage du sucre, du calcium et du phosphore dans le sang, et surtout un électro-encéphalogramme. Lorsque les convulsions répondent à des lésions organiques du cerveau et traduisent l'épilepsie, il faut alors prescrire le régime céto-gène. Si le régime céto-gène, qui donne de bons résultats dans 50% des cas, ne suffit pas ou est refusé par l'enfant, il faudra donner des médicaments: phénobarbital, auquel il convient de donner la préférence, ou encore le "dilantin" ou le "mesantoin", s'il s'agit du grand mal; "thyphenytoin", "paradione" ou "triméthadione", s'il s'agit du petit mal. Il y a des cas d'épilepsie, qui ne peuvent être améliorés ou guéris que par le traitement chirurgical, comme ceux qui ont pour cause une tumeur cérébrale ou autre lésion susceptible de bénéficier de l'acte opératoire.

Quoique l'hérédité joue un rôle incontestable, la prophylaxie doit s'inspirer des autres notions étiologiques (en particulier de celles du traumatisme obstétrical évitable), qui laissent entrevoir la possibilité de diminuer le nombre des cas de convulsions infantiles, et surtout d'épilepsie, avec troubles du développement intellectuel.

PAUL LETONDAL

La société médicale des hôpitaux universitaires de Québec

Reunion de la société médicale des hôpitaux universitaires de Québec, vendredi, le 17 septembre 1948.

Deux cas de chirurgie du larynx: laryngectomie et arythénoïdectomie.—Louis Royer, M.D. et François Roy, M.D.

L'auteur passe en revue les principales indications des traitements chirurgicaux du cancer laryngé. Un patient laryngectomisé est présenté avec son observation clinique. La nécessité d'un diagnostic précoce comme seul moyen d'abaisser le taux de mortalité causé par le cancer du larynx est soulignée. La deuxième partie de la communication traite de la paralysie bilatérale des cordes vocales. L'observation clinique d'une malade guérie de la dyspnée inspiratoire causée par cette afflication est rapportée. L'opération de choix i.e., l'arythénoïdectomie est décrite brièvement.

Bec de lièvre et fente palatine.—François Roy, M.D. et Jules Lavoie, M.D.

Les auteurs rapportent 156 cas de becs-de-lièvre et de fentes palatines opérés à l'Hôtel-Dieu de Québec depuis 10 ans; 55 de ces cas n'intéressaient que le palais. Un grand total de 284 opérations furent pratiquées et l'on n'eut à enregistrer que deux décès, soit une mortalité opératoire de 0.7 de 1%. L'âge des malades variait de 1 mois à 22 ans, la grande majorité ayant subi leur première intervention vers l'âge de 4 mois. Présentation de malades et de photos.

Méningite à pneumobacille de Friedländer: Guérison.—J.-B. Jobin, M.D. et R. Lessard, M.D.

L'observation d'une malade souffrant de méningite à pneumobacille de Friedländer d'origine otogène est rapportée. Le traitement mixte a consisté en l'administration de sulfadiazine, de pénicilline et de streptomycine. L'affection a guéri en vingt-quatre jours. La patiente qui avait été en contact avec trois de ses enfants souffrant des oreillons, malgré la médication intensive à laquelle elle a été soumise, a présenté les symptômes classiques de la maladie, après la période d'incubation normale.

Deux ans de traitement du lupus tuberculeux par la vitamine D₂: 20 cas.—Emile Gaumond, M.D.

Vingt malades atteints de lupus tuberculeux ont été traités par la vitamine D₂ en solution alcoolique. La guérison obtenue est non seulement clinique mais anatomique. La médication a été très bien tolérée chez tous les malades. Aucun incident désagréable n'est survenu même après plus de dix-huit mois de traitement continu. Il nous paraît superflu d'ajouter le calcium à la vitamine D₂ lorsque le régime alimentaire est convenable. La vitamine D₂ doit être continuée plusieurs mois après la guérison constatée afin d'éviter les récidives. Presque toujours une aggravation passagère se produit au début du traitement, conséquence sans doute d'une réaction biotropique directe vis-à-vis le processus tuberculeux. Le mécanisme d'action de la vitamine D₂ (Calciférol) dans le traitement des tuberculoses externes n'est pas encore déterminé. Peut-être s'agit-il de déphosphorylation? La vitamine D₂ semble bien produire de bons effets dans d'autres formes de tuberculose. On se demande si elle ne pourrait pas se montrer utile au traitement de la lèpre. En essai sera fait.

Ontario Medical Association, District No. 11

District No. 11 of the Ontario Medical Association which includes the metropolitan area of Toronto and has over 1,100 members had an annual business meeting attended by 65. Dr. W. V. Johnston, president of the Ontario Medical Association said that a uniform system of payment was demanded by the public, who are thinking of health insurance. The public has a right to ask for health insurance, the physicians have a right to ask them to go slowly, the Canadian people have every right to help themselves pay for medical service.

Dr. A. D. Kelly spoke on Canada's Health Program. Thirty million dollars is to be spent in the next five years. It is likely that the treatment of cancer, venereal disease, tuberculosis and mental diseases will be free to the patient in all parts of Canada as they are now in some provinces. Possibly arthritics will join this group. More hospital beds are to be available. This means more medical and nursing work to be done and more government control of medical practice. Doctors must help the public and the government with these new arrangements. The private practitioners must play their part. The public is intelligent and wants facts not propaganda.

The following were elected district counsellors: Dr. R. H. Malyon, Dr. J. Z. Gillies; senior vice-counsellors: Dr. G. M. Blois, Dr. P. L. Irvine; district representatives on the nominations committee O.M.A. Drs. S. J. N. Magwood, S. M. Campbell, W. A. Burr, E. G. Wheler, W. F. Plewes, C. D. Gossage, S. J. Forrest; alternates: Dr. O. A. L. McCormack, Dr. C. M. Warren.

The scientific meeting was addressed by Sir Archibald McIndoe. He told of his work on plastic surgery with the Royal Air Force. Of the 22,000 members of the R.A.F. who were badly burned, "incinerated" was the word he used, 4,000 were saved, 200 of these had their faces entirely burned off. He described his plans of treatment, first he cared for the eyes in order to save the sight. His illustrations showed amazingly good results. In moving the vote of thanks Dr. Fulton said that today some people were selling England short but as long as the Old Country could produce men like Sir Archibald no one need worry about England's future.

Ontario County Medical Association

The Ontario County Medical Association held their annual meeting at the Ontario Hospital, Whitby. Dr. A. W. M. White of Toronto spoke on "Compound Fractures" and Dr. H. D. Logan of Lindsay on "Physicians' Services Incorporated". Thirty doctors and their wives were present at the dinner when Dr. D. R. Fletcher, superintendent of the hospital was presented with monogrammed gold cuff links as a token of appreciation for past hospitalities.

LILLIAN A. CHASE.

NOTES ON GENERAL PRACTICE

[This column will be devoted to points concerned with general practice. Questions are welcomed. They will be answered by well qualified men. Other short contributions or notes on general practice will also be welcome. General practitioners are particularly invited to make use of the column. All communications should be signed, but the writer's name will be omitted on request.—EDITOR.]

Q. Is sodium amytal less habit-forming than sodium seconal, and if so why?

A. Neither sodium amytal nor sodium seconal are as a rule habit-forming, as the side reactions to large doses are likely to prevent it. Nevertheless, there are certain individuals who seem to acquire habits more readily than the average run of the population and I have no doubt that these individuals might become addicts. Just why they do no one knows.

Q. Have thiocyanates any place now in our therapy of hypertension?

A. At the present time the status of therapy for hypertension is pretty much in a state of flux. Thiocyanates, rice diet, dorsal lumbar sympathectomy are all *sub judice* at the present time. Until the cause of high blood pressure has been determined rational therapy cannot be instituted. There are those who believe that thiocyanates reduce blood pressure by poisoning the myocardium.

Q. Are there any drugs acting on the autonomic nervous system which might complement the will power in abstaining from cigarettes?

A. It would seem that any individual who has not the will power to abstain from cigarettes for the sake of his health must have so little that complementary drugs are not likely to be of any benefit.

Q. Are antihistamine drugs of any value in gastrointestinal allergy?

A. Antihistamine drugs have been used in the treatment of gastro-intestinal allergy with some success. As in any other allergic state they work only in a moderate proportion of patients, and have been used to control such symptoms as nausea and vomiting. It is claimed by certain observers that they can also control to a certain extent abdominal cramps and diarrhoea due to the ingestion of foods to which the patient may be sensitive. It is probably worth while remembering, however, that part of their action may be due to their sedative and atropine action as well as their antihistaminic effect. It should also be pointed out that their action in this connection is palliative only. The usual dose is 25 to 50 mgm. taken at the beginning of a meal.

Doctors in the United States

In a recent broadcast the following question was put to Oscar R. Ewing, Administrator of the Federal Security Agency: "Do you know of any country that has more doctors in proportion to its population than the United States?"

To this Mr. Ewing replied, "I don't. . . . I just don't know the answer one way or the other. Whether there are or aren't. I can't tell you."

The *Journal of the American Medical Association* supplies the defect in Mr. Ewing's knowledge by giving the following figures based on a survey conducted in 1948 by the World Medical Association.

The United States 710 persons for each physician, 870 for Great Britain, 950 for Denmark, 970 for Canada, 1,100 for Australia, Switzerland, Sweden, Spain, Norway, and the Netherlands, 1,300 for France, 1,500 for Eire

and Bulgaria, 2,200 for Finland, 2,400 for the Union of South Africa, 4,200 for Egypt, and 25,000 for China. Jewish Palestine has a rate of 260 for each physician, due to excessive numbers of refugee physicians.

CANADIAN ARMED FORCES

News of the Medical Services

Brigadier W. L. Coke, Director General of Medical Services of the Canadian Army, Surgeon Commander H. R. Ruttan, O.B.E., representing the Medical Director General, Royal Canadian Navy, and Wing Commander G. D. Caldbick, representing the Director of Health Services, Royal Canadian Air Force, attended the annual convention of the Association of Military Surgeons of the United States at Fort Sam Houston, San Antonio, Texas, November 11 to 13, 1948. This Association was chartered by an Act of Congress in 1903 with the intention of bringing together officers of the government services to promote the advance of military medicine, and since 1943 has invited representatives of the Canadian Armed Forces to attend its meetings.

Following the convention, at the invitation of the Surgeon General of the United States Army, Brigadier Coke spent the rest of the month visiting various U.S. Army Medical installations, commencing with the Medical Field Service School and the 2,600-bed General Hospital at Brooke Army Medical Centre, Fort Sam Houston. Among the other western units inspected were the Fitzsimmons General Hospital at Denver, Colorado, and the Key Medical Depot and Base Medical Workshop at St. Louis, Mo. During his western tour, Brigadier Coke was also able to visit units of the Reserve Officers' Training Corps at the University of Colorado, and at St. Louis and Washington Universities; the latter visits were of particular interest, in view of the emphasis being placed on the C.O.T.C. program in Canada.

Returning East, Brigadier Coke spent four days in Washington becoming acquainted with the organization of the various departments of the Surgeon General's Office, and also made a tour on Thanksgiving Day of some of the points of historic interest in the vicinity. Proceeding to Philadelphia on November 27, he visited the R.O.T.C. unit at Jefferson Memorial College, and later saw the annual Army-Navy football match. He concluded his tour with a visit to the Engineer Development Division of the Army-Navy Medical procurement Office, Fort Totten, N.Y., returning to Ottawa December 1, 1948.

The three Army Medical Officers who wrote the recent examinations held at Montreal by the Royal College of Physicians and Surgeons of Canada were successful. Lieut.-Col. G. H. Raymond has been admitted as F.R.C.S., Major A. F. Nancekivell as F.R.C.P., and Major F. W. McCaffery has received his certificate as Specialist in Anaesthesia.

Lieut.-Col. E. J. Young, R.C.A.M.C., member for the Department of National Defence of the Technical Advisory Committee on Public Health Laboratory Services, attended the annual meeting of the committee, which was held in Ottawa at the Department of National Health and Welfare offices December 9 to 11, 1948. The function of the committee is to advise the Minister of National Health and Welfare on matters relating to public health laboratory services in Canada. Of particular concern to the armed forces was the conclusion reached by the committee that there is a dearth of adequately trained professional bacteriologists in Canada.

The new armoury on St. Urbain St., Montreal for Army Medical and Dental units was opened on November 29, 1948. The former hospital building has been extensively altered by the Department of National Defence, and now provides a commodious and well-designed centre for the training of the Reserve Force. It houses eight R.C.A.M.C. units and one R.C.D.C. company, each unit having separate orderly rooms and locker space for its technical equipment. Certain facilities are common to all units, such as the composite quartermaster stores, messes, drill floor and lecture rooms. Training takes place three nights weekly and where possible the various medical units pool instructional facilities for subjects common to all.

It has been decided on a three Service level to blood group all personnel of the Navy, Army and Air Force. Blood grouping will follow the International classification and, in addition, will include information concerning the Rh (anti D) factor. It is proposed that this blood grouping program should start in Ontario early in January, 1949.

A course in blood grouping for Service laboratory technicians will be conducted in Toronto, under the expert supervision of the Canadian Red Cross Society's Blood Laboratory there. During the month of January, blood specimens will be collected from personnel in Service establishments and forwarded to this laboratory for grouping. It is expected that by this means a dual purpose will be served; Service laboratory technicians will be trained in the latest methods of blood grouping and information will be collected regarding the blood group of Service personnel for use as required.

W. L. COKE, BRIGADIER

SPECIAL CORRESPONDENCE

The London Letter

(From our own correspondent)

RESEARCH IN CHILD DEVELOPMENT

Under the ægis of the Institute of Child Health and the Institute of Education of the University of London a joint training and research centre has just been established in London. The main aim of the centre is to carry out a long-term and comprehensive study of the development of children, both physical and psychological, from birth to adolescence. In addition to obtaining badly needed data on this vitally important subject it is hoped that precise information will be obtained on the advantages and drawbacks of nurseries and nursery schools. The other important function subserved by the new centre will be as a training centre for supervisors and tutors for the Central Council for Training in Child Care which is responsible for the training of boarding-out officers and house mothers under the Children Act.

This is one of the most important developments in child health which has taken place in this country, and information derived from its investigations should prove invaluable to all who are concerned with the physical and moral welfare of the children of the country.

ANOTHER NUFFIELD BENEFACTION

Although the idea of an Academy of Medicine has apparently been pigeon-holed for the time being, the Royal College of Surgeons are pushing ahead with their plans for converting Lincoln Inn Fields into a post-graduate medical centre worthy of the best traditions of British medicine. In their efforts the College has been munificently aided in the past by Lord Nuffield who is now an honorary Fellow of the College. Lord Nuffield has now added to his many benefactions a gift of

£250,000 to be devoted to the erecting of a College of Surgical Sciences. To be known as the Nuffield College of Surgical Sciences, it will provide accommodation for those engaging in study and research and allow them to enjoy the privileges of collegiate life, meeting each other and also the leading surgeons of this country as well as distinguished visiting surgeons from abroad. As a temporary measure, pending the erection of the new buildings, accommodation for twenty postgraduate surgical students is being prepared in a house adjacent to the College.

A NEW TRYPANOCIDE

Much interest is being evinced in the announcement from the Colonial Office of the discovery of a new trypanocide, "antricyde", which the Under-Secretary of State for the Colonies has described as "one of the great advances made in science". Discovered and evolved by the same research team as was responsible for paludrine, the new drug has been submitted to extensive laboratory and field trials. No data has yet been made available in the medical or scientific press, but according to the announcement from the Colonial Office, it has been found effective in the Sudan and East Africa against most of the trypanosomes responsible for disease in cattle. One of the most interesting claims for the new drug is that it is of prophylactic, as well as curative, value, protection having been maintained against *T. congolense* for six months. Although given parenterally, it is considered that cattle growers can give the injections themselves without calling in a veterinary surgeon. Should further trials confirm these initial enthusiastic reports, 1949 is indeed opening auspiciously for tropical Africa.

N.A.P.T. JUBILEE

The jubilee celebrations of the National Association for the Prevention of Tuberculosis have brought well-deserved publicity to one of the most active voluntary organizations in this country. In 1898 when the inaugural meeting was held at Marlborough House under the chairmanship of King Edward VII, then Prince of Wales, the idea that what was preventable might be prevented was still a novel idea. A review of the fifty years that have elapsed since then amply proves the truth of the idea, and there can be no doubt that the N.A.P.T. can claim a useful share in the credit due for the steady fall in the tuberculous morbidity and mortality rates during this period. Under the skilled direction of its energetic secretary-general, Dr. Harley Williams, the association is now devoting an increasing amount of its attention to the problem of tuberculosis in the Commonwealth and Colonial Empire.

TRAINING THE BLIND

The latest report from St. Dunstan's, the world-famous training centre for blinded Service men and women, which covers the year ending March 31, 1948, makes as fascinating reading as its predecessors. Since 1914 there have been 4,500 men and women blinded as a result of war service, and there are still 151 receiving training. One of the interesting features of the methods at St. Dunstan's is that new arrivals still suffering from shock and depression after blindness are given no special psychological treatment. Good surroundings, a fully occupied day, the example of fellow-victims and the presence of blinded men as teachers have been found to be a much more satisfactory curative regimen. As opposed to the post-1918 era when men were trained to work at handicrafts in their own homes, it has now been found more satisfactory to train the blinded to operate semi-automatic machinery and to work on assembly, packing and testing jobs in factories. WILLIAM A. R. THOMSON
London, January, 1949.

ABSTRACTS FROM CURRENT LITERATURE

Medicine

Apical Systolic Murmur. Masters, A. M.: *Arch. Int. Med.*, 81: 518, 1948.

The importance of apical systolic murmur, too frequently disregarded, attracted a good deal of attention because of cases in the American armed forces, who were admitted to the Services and proved unable to endure the stress and strain of war, both physical and mental. Many developed heart failure, spent months in hospital, and were left severely disabled. The problem confronts us also in civilian life. Emotional stress, prolonged exertion, recurrence of rheumatic fever, or streptococcus haemolyticus infection may result in heart failure here as well as in the Services. From estimates of insurance companies the presence of an apical systolic murmur in people under forty years means three times the normal mortality figure and if there is also a history of rheumatic fever the rate rises to four and one-half times the normal mortality rate.

Since subacute bacterial endocarditis develops in a considerable percentage of those who have had rheumatic fever it is essential that deformity of the mitral valve should be recognized as early as possible. A loud apical systolic murmur should be considered indicative of organic valvular disease until it is disproved and the patients warned against severe physical or emotional strains. Several cases are quoted to illustrate this premise.

The diagnosis of the presence, or absence, of cardiac valvular damage is based on a history of rheumatic fever, or of an infection with haemolytic streptococcus, frequent examinations in varied postures or after exercise. A diastolic murmur discovered by such thoroughness confirms the diagnosis of valve damage as does a loud and prolonged apical systolic bruit. Deformity of the chest will often cause disturbance of heart function with apical systolic murmur since because of the narrow space between the breastbone and the vertebral column the heart may be rotated to the left. This sometimes occurs in cases with kyphoscoliosis. The differentiation between this condition and a split first sound, hypertension, hyperthyroidism, anemia murmurs, respiratory murmurs is not difficult because of the symptoms of these conditions being usually fairly obvious. The loudness or intensity of the murmur is a cardinal point in deciding that there is organic trouble present.

P. M. MACDONNELL

Radioactivity and Urinary-Tract Calculi. Cristol, D. S., Bothe, A. E. and Grotzinger, P. W.: *New England J. Med.*, 239: 427, 1948

A patient with a large vesical calculus and several prostatic calculi was found to have polycythemia vera. Two doses of radioactive phosphorus were administered to control the blood disorder. After operation, seven months later, the bladder stone was found to have a lamella which was radioactive when exposed to the Geiger counter and to photographic film. The centre of the stone, representing the portion present when first observed, had no radioactivity. The prostatic calculi removed at the time of operation likewise had no radioactivity. Radioactive phosphorus may prove to be a valuable tool in the study of the formation of urinary-tract calculi. It may also serve as a means of observing the effect of an acid-ash diet on the formation of alkaline stones.

NORMAN S. SKINNER

Thoracoplasty After Twenty Years. Dufault, P.: *New England J. Med.*, 239: 660, 1948.

At the Rutledge State Sanatorium, Massachusetts, 362 patients underwent thoracoplasty during the twenty-year period 1927 to 1946. This represented 6.3% of admissions.

There has been no change in the clinical indications for the operation over the twenty years. There has been a survival rate of close to 70% of the patients operated upon and 61.3% are well and working. Since pulmonary tuberculosis is becoming less frequent in the younger age group and since sanatorium patients are now noticeably older and sicker than they were in the past the percentage of patients suitable for thoracoplasty is showing a steady decline. NORMAN S. SKINNER

Intussusception in Childhood. Gross, R. E. and Ware, P. F.: *New England J. Med.*, 239: 645, 1948.

Prompt treatment of intussusception is essential if mortality is to be kept at a minimum and, since the condition is particularly common in the first few years of life, it must be constantly kept in mind when dealing with babies and young children. The present report concerns 610 cases of intussusception dealt with at the Children's Hospital, Boston. Only 16% occurred after the age of two years, 72% being less than twelve months of age. Discernible etiological factors were present in only 5.4%, usually a Meckel's diverticulum.

Important factors in diagnosis are sudden, severe, paroxysmal seizures of abdominal pain (usually occurring in a previously well infant of superior nutrition and development) and vomiting. Blood is present in the stool in 85% of cases within twenty-four hours of onset and in about half of these cases the bleeding is gross and may be copious, being occult in the remainder. An abdominal mass, usually not particularly tender, is palpable in 85%. Rectal examination will detect the mass in about a quarter of the cases.

Roentgenologic examination is not often necessary but may be helpful in 10% of cases, demonstrating a filling defect in a barium enema with a thin shell of barium visible around the intussusceptum in the post-evacuation film. While reduction of an intussusception may be accomplished by rectal injection of barium under fluoroscopic control such a procedure carries a risk of failure of complete reduction. Surgery is the method of choice in treatment. If resection is necessary exteriorization is strongly advised to lessen mortality. Post-operative care includes the use of gastric suction, transfusions of blood and plasma, infusions of glucose and saline and, in certain cases, chemotherapy and a high-concentration oxygen tent.

In this series a steady decline in mortality was demonstrated from a high of 59% for the period of 1908 to 1912 to a low of 2.7% for the years 1946 and 1947. The greatest factor in this steady improvement is considered to be the greater awareness of the condition with consequent early diagnosis and prompt treatment.

NORMAN S. SKINNER

Surgery

Technique d'amputation basse de la cuisse. (Technique of low thigh amputation.) Holden, W. H.: *Surg., Gyn. & Obst.*, 87: 739, 1948.

Le traitement de l'artérite oblitérante avec ischémie et gangrène, présente encore de multiples problèmes. Cependant grâce aux connaissances acquises sur la glycémie concomittante, les électrolytes, l'équilibre des liquides, et le métabolisme des protéines, des progrès notables ont déjà été réalisés. Les antibiotiques et la chimiothérapie ont en grande partie neutralisé les infections pyogéniques. Cependant, c'est encore l'amputation basse à la cuisse, que l'artérite oblitérante commande le plus souvent. L'amputation à la région métatarsienne ou aux orteils, justifierait au préalable, la sympathectomie lombaire, cette sympathectomie serait aussi indiquée dans les douleurs souvent satellites de l'ischémie.

Au cours des deux dernières années, on a pratiqué dans les hôpitaux universitaires de Cleveland, 35 amputations au tiers inférieur de la cuisse, dans les cas de lésions sus-mentionnées. Et la technique utilisée est préconisée par l'auteur. D'après l'auteur, les avantages essentiels de cette incision sont les suivants: plus

grande facilité d'exécution opératoire, meilleur contrôle de l'asepsie et de l'hémorragie, laceration tissulaire moindre, diminution de l'intensité du choc opératoire, position unique et commode du membre à amputer pendant tout le cours de l'opération et durée raisonnable de l'intervention: 10 à 20 minutes. PIERRE SMITH

Incision abdomino-thoracique combinée, spécialement adaptée aux cas de gastrectomie totale et d'œsophagogastrectomie. (A combined abdominothoracic incision particularly adapted for use in total gastrectomy and œsophagogastrectomy.) Kremen, A. J.: *Surgery*, 24: 605, 1948.

Dans les cancers gastriques haut situés et certaines lésions de l'œsophage inférieur, la facilité d'exécution opératoire est en fonction d'une longue incision abdomino-thoracique adéquate. Avant que la physiologie respiratoire au cours des opérations thoraciques ne fut connue, les chirurgiens redoutaient au cours de ces opérations certaines complications souvent graves. Depuis que ces dangers peuvent être prévenus, on a préconisé diverses incisions thoraco-abdominales.

D'après l'auteur aucune d'elles n'offre à la fois un jour assez considérable pour pratiquer une gastrectomie totale, une résection œsophagienne basse et une anastomose de continuité dans des conditions idéales de facilité et de sécurité. L'incision que décrit l'auteur commence au bord externe du grand droit, un peu plus bas que l'ombilic et se dirige d'abord horizontalement et monte ensuite obliquement vers le rebord inférieur du 8ième cartilage costal gauche sur le prolongement du 7ième espace intercostal, et se termine à la ligne axillaire gauche. L'ouverture du diaphragme se pratique à mi-chemin du rebord cartilagineux jusqu'à l'hiatus œsophagien; elle est plus ou moins étendue selon les exigences des manœuvres opératoires. Le phrénique gauche écrasé ou sectionné au niveau de la surface gauche du péricarde, diminue l'amplitude des mouvements diaphragmatiques correspondants, ce qui facilite les gestes de l'opérateur et la cicatrisation ultérieure du diaphragme.

Jusqu'à présent, l'auteur a utilisé cette incision, sans ennui consécutif, dans 8 cas d'opérations abdomino-thoraciques. PIERRE SMITH

Ruptured Quadriceps. Lloyd, E. I.: *Brit. J. Surg.*, 36: 94, 1948.

Though fracture of the patella is about 80 times as frequent, the sudden convulsive extension of the knee in a heavy elderly man results in a rupture of the quadriceps tendon, and this is much more common than rupture of the patellar ligament. An x-ray shows the patella on the ruptured side to be much lower than normal, but if thought of, the diagnosis is simple. Open operation, without tourniquet and after prophylactic penicillin, should be done immediately, but suture is worthwhile within three months. Pulmonary embolism is a complication to be avoided by foot and leg exercises through the convalescence. It is likely that the last few degrees of extension will be lost, but the insecurity is slight. BURNS PLEWES

The Surgical Treatment of Carcinoma of the Hypopharynx and Oesophagus. *Brit. J. Surg.*

This Hunterian Lecture is a summing up of many years' experience in the treatment of carcinoma of the upper gastro-intestinal tract. The author believes that carcinomas of the nasopharynx and oral pharynx should be treated by radiation. Retrocricoid carcinoma is almost confined to women but 80% of œsophageal carcinomas occur in males. Dysphagia is often a late symptom and the first evidence of the disease may be the enlargement of lymph-nodes in the neck. Hoarseness and persistent chest or back pain are of grave significance. In a study of 70 autopsy cases there were no metastases in 22%. Most tumours were epidermoid, half keratinizing and slow to metastasize, and half anaplastic and showing metastases in 92%.

Thus there is a very good chance of the disease being a purely local problem where an early diagnosis is made. X-ray studies may not reveal a lesion in the hypopharynx and œsophagoscopy is important. Surgical operations for the removal of malignant growth should include methods of reconstruction of the œsophagus.

Operations for carcinomas of the hypopharynx, upper œsophagus, middle œsophagus and lower œsophagus are carefully described, and the postoperative care outlined. The special problem of a growth too high for œsophago-gastrostomy is solved by forming a skin-tube in front of the sternum.

BURNS PLEWES

Obstetrics and Gynæcology

Vaginal Hysterectomy for Cancer of the Uterus and Vagina. Trapl, J.: *J. Obst. & Gyn. Brit. Emp.*, **55**: 303, 1948.

There is only one real objection to the vaginal approach in cases of carcinoma of the cervix; the impossibility of picking out and removing completely the iliac lymphatic glands. But in view of the fact that far more of the parametrial tissue is removed by the vaginal than by the abdominal operation; that the glands in patients with Grade 1 carcinoma are only rarely involved; and lastly, that by supplementary x-ray and radium treatment the remaining glands can be destroyed, the abdominal approach cannot be considered as the more reliable one. The advantage of the abdominal method is the clear operating field and the better access to the pelvic organs. The technique of abdominal operations is in most cases an easier one, not demanding so much experience or exertion of the surgeon or of his assistants. Laparotomy can be learnt more easily, the assistant can be guided directly by the teacher. When operating vaginally, on the other hand, the surgeon must proceed far more individually, often even the assistant sitting next to him cannot follow the operation completely. Vaginal operation certainly requires more experience and skill than a laparotomy.

P. J. KEARNS

The Use of the Phase-Contrast Microscope in Clinical Gynæcology: A Preliminary Report. Culiner, A. and Gluckman, J.: *J. Obst. & Gyn. Brit. Emp.*, **55**: 261, 1948.

The phase-contrast microscope has an immediate, direct use in the study and diagnosis of gynæcological tissues obtained by aspiration, curettage, or smear. Because such tissues can be observed and studied while the patient is being examined clinically, and because these tissues require no fixation or staining in order to show greater details of cell structure than by any other method in current use, it is considered that application of the instrument should constitute a significant advance in the early recognition of cancer. It is anticipated that with further investigations and the consequent elaboration of criteria essential to accurate diagnosis, this technique will be applied to the study and diagnosis of early exfoliative malignancies as well as to the less vital analysis of infections and hormonal disturbances as manifested in the gynæcological tract. An important advantage to the method lies in the fact that several examinations can be performed in a very short space of time and successive areas of cervix may be examined.

P. J. KEARNS

Prediabetic Pregnancy. Barns, H. H. and Morgans, M. E.: *J. Obst. & Gyn. Brit. Emp.*, **55**: 454, 1948.

In confirmation of the work of other investigators it is shown that (1) the birthweight of infants born of women who subsequently develop diabetes tends to be greater than normal and (2) the total fetal mortality-rate in such pregnancies is higher than is usual in non-diabetic pregnancies, and that this rate increases as the onset of diabetes is approached. The abortion-

rate in pregnancies before and after the onset of diabetes is not found to be significantly different from the normal. In explanation of these findings the possible rôle of an overfunction of the anterior pituitary lobe in both the prediabetic and diabetic stages is discussed.

P. J. KEARNS

Thoracoplasty and Pregnancy. McIntyre, J. P.: *J. Obst. & Gyn. Brit. Emp.*, **55**: 448, 1948.

Observations on the relations of pregnancy in 12 tuberculous patients with thoracoplasty are recorded. A review of relevant medical literature is also included. Deserving of special mention is the one case in which thoracoplasty was performed during pregnancy. Complaints during the gestational period were few, there being 2 with blood-stained sputum and one with pain in the right side chest. Respiratory embarrassment of slight degree was noted in 2 patients during labour. Deductions drawn from this small series of cases subscribe to the feasibility of pregnancy in the patient with thoracoplasty.

P. J. KEARNS

Cervical Obturation with Inflatable Cannula in Uterotubal Insufflation and Hystero-salpingography. Rubin, I. C. and Myller, E.: *Am. J. Obst. & Gyn.*, **56**: 1077, 1948.

The importance of cervical obturation in the procedure of uterotubal insufflation and hysterosalpingography is emphasized. Desiderata of the ideal uterine cannula are: painless application unaccompanied by trauma, airtight closure of the cervical canal, maintenance of the normal anatomical position of the uterus. A new cannula with inflatable balloon for cervical obturation is described.

ROSS MITCHELL

Habitual Abortion: A Pathologic Analysis of 100 Cases. Wall, R. L. and Hertig, A. T.: *Am. J. Obst. & Gyn.*, **56**: 1127, 1948.

The etiology of a series of 100 habitual aborters varies both in extent and proportion, as does a series of 1,000 spontaneous abortions also studied in the laboratory of the authors. Individually, however, these habitual aborters repeated the same etiology in 58% of the cases; 43% being due to ovular factors and 15% due to maternal factors. Pathologic ova were found to be the commonest etiology in habitual abortion, occurring in 62% of the 58 cases. All other causes accounted for less than 10% each of habitual abortions. Furthermore, the more often these patients aborted, the more often they repeated the same etiology.

It should be evident that any woman who aborts is potentially an habitual aborter. Therefore, it is important that the very first abortus of any patient should be thoroughly examined pathologically. This is apparently not often done, since many of the hundreds of records reviewed by the authors revealed previous abortions which had not been submitted for examination. The fact that, in this series, 99% of habitual aborters returned repeatedly to the same clinic or physician demonstrates the feasibility of having all abortions examined pathologically as an aid to prognosis and therapy. By submitting all abortions to such examination, both the patient and her physician can become intelligently prepared for any subsequent abortions.

An increasing number of reports in the literature have appeared showing the satisfactory reports from using specific therapy against certain factors causing recurring abortions; for instance, the use of endocrines in apparently forestalling the production of pathologic ova and vitamin E in preventing fetal anomalies. To give these treatments more rationale, the physician should know, whenever possible, whether the previous accidents of pregnancy were due to definite ovular or maternal causes. An appeal for this approach pointing out the means of obtaining it is the essence of this study.

ROSS MITCHELL

Rh Sensitization in a Primipara Caused by Intramuscular Injection of Human Serum Resulting in Fatal Erythroblastosis. Wallace, J. T., Wiener, A. and Doyle, M. H.: *Am. J. Obst. & Gyn.*, **56**: 1163, 1948.

A case is reported in which a young primigravida is presumed to have been sensitized to the Rh factor by an injection of pooled human serum, given as a prophylactic measure against poliomyelitis during childhood, and in whose baby fatal erythroblastosis developed. Accordingly, the authors would like to emphasize to clinicians that the injection of serum or plasma into Rh-negative women may create Rh sensitization. The hazard of such injections is at times as great as that accompanying the injection of Rh-positive whole blood, and may deprive even primiparas of the opportunity of having normal babies. Therefore, it is urgently recommended that in taking obstetric histories careful inquiry should be made into whether or not such injections have been received by the patient. It is likewise recommended that all physicians exercise utmost care and discretion in the use of these substances.

Since the publication of this report the attention of the authors has been called by personal inquiry from a California physician, to a second case of erythroblastosis in a first-born baby whose mother may have been sensitized by injection of pooled serum as a prophylactic measure against poliomyelitis. ROSS MITCHELL

Pædiatrics

Infections Croup, II: "Virus" Croup. Rabe, E. F.: *Pædiatrics*, **2**: 415, 1948.

At one time synonymous with diphtheria, this term is now applied to a group of infections, at first pharyngeal, which tend to spread towards the trachea and bronchi, causing varying degrees of respiratory obstruction: hoarseness, inspiratory stridor, inter- and infra-costal retraction. The author has studied 347 cases of croup and divides them into three classes: diphtheria, *Hæmophilus influenza* (Type B) croup, and "virus" croup. Although a variety of organisms can be recovered on culture, the cases of the last category show lesions and progress which are alike and justify their grouping under that name, although the exact etiology is unknown. Congestion and oedema are maximal in the infra-glottic region. The exudate, clear at first, soon becomes thick and tenacious. Extension of the process may result in bronchial plugging or bronchopneumonia. This picture is somewhat different from that of *Hæmophilus influenza* (type B) croup, where inflammation is quite marked above the glottis. Apart from bronchopneumonia, the most important complication of "virus" croup is mediastinal emphysema with pneumothorax. It may happen before or after tracheotomy; however, this operation tends to prevent it. Treatment also includes inhalation of moist oxygen, and sulfadiazine until *Hæmophilus influenza* is found to be absent from the culture. PAUL DE BELLEFEUILLE

Neurology

Pallhypæsthesia. Goldblatt, S.: *Arch. Neurol. & Psychiat.*, **59**: 292, 1948.

Determination of vibratory appreciation by application of the stem of a tuning fork to the bony prominences is part of any routine neurological examination. The pathways for vibratory conduction are described as running from receptor endings in the tendons and muscles through the deep nerves to the posterior roots, to the posterior columns of the ipsilateral side to nuclei of Goll and Burdach, then across to the medial fillet and up to the thalamus and fanwise to the post central cortex. Gasser and others have shown that vibratory appreciation, light touch sensibility and position sense are carried by the large myelinated fibres, and that the velocity of the impulse is rapid.

In 1941 Roth devised a modified tuning fork designed to quantitate accurately levels of pallæsthesia. With this instrument 200 unselected patients in the sections of dermatology and venereal diseases of an army general hospital were studied. The majority of patients with a history of mechanical trauma to the head and all patients with cerebral injury following exposure to severe blast showed a pronounced diminution of vibratory appreciation. Depression of pallæsthesia in patients with dyscrasias of the thyroid gland was described for the first time. All patients with untreated, mild or moderate hypothyroidism showed a grave depression of vibratory appreciation. Elevation of levels of pallæsthesia occurred in some patients to normal values after treatment with thyroid. All but 3 of 53 patients with syphilis in all stages showed a severe impairment of pallæsthesia. A gradual rise in the curve of pallæsthesia was noted in the post-treatment period. This elevation was with 2 exceptions never sufficient to attain normal levels.

The article is a preliminary report. It will be interesting to follow further developments as quantitative methods of measuring sensation are notably poor.

J. PRESTON ROBB

Cysts, (Perineural) of the Sacral Roots. Tarlov, I. M.: *J. Am. M. Ass.*, **138**: 740, 1948.

Cysts of the posterior sacral nerve roots seem to constitute another cause of the sciatic syndrome which may be dealt with satisfactorily at operation. In patients with sciatica thought to be due to a herniated intervertebral disc, requiring operation, and in whom interlaminar exploration fails to reveal a protruded disc or other abnormality sufficient to have accounted for the pain, removal of the posterior arch of the sacrum should be done in order to determine whether a perineural cyst is present. Moreover, in patients with persistent severe sciatic pain following negative results of exploration for herniated intervertebral discs, and in whom the known causes of sciatica have been excluded, consideration should be given to the advisability of exploration for sacral perineural cysts. By following the practice, the author feels the incidence of negative results. By following the practice, the author feels the incidence of negative results of exploration in the surgical treatment of sciatica will probably be reduced.

A case is presented. It is interesting to note that myelography was considered unnecessary. It might also be added that if a myelogram was done in all cases of suspected intervertebral disc the incidence of inaccurate diagnosis would be less, and the results of surgery better.

J. PRESTON ROBB

Dermatology

Prophylaxis Against Allergy. A Pædiatric Program. Shulman, M. H.: *New England J. Med.*, **239**: 391, 1948.

The definition of allergy as "an altered reactivity of tissues following the introduction of foreign proteins by inhalation, ingestion or injection" is one that will meet with general acceptance, but fails to include environmental or "contact" allergens. While it is claimed that food is of prime importance in precipitating allergic manifestations, the author admits that environmental factors cannot be exonerated. Among the latter he includes mattress fillings of organic material, feathers, heavy draperies, insect sprays (nearly all contain pyrethrum, a close relative of ragweed) woolly toys stuffed with kapok or cotton lint, scented powders and oils and shampoo lotions, and domestic pets as objects to be excluded from the environment of potentially allergic children.

Children of allergic parents are regarded as potentially allergic because in 50 to 70% of allergic patients there is an allergic family history whereas only 7% of non-allergic people have an allergic family history.

It is estimated that about 75% of all children with bilateral and 50% with unilateral allergic inheritance will eventually show allergic manifestations. The family history of all children should be scrutinized in this respect in order that prophylactic measures may be established in the case of the potentially allergic. Some inhalants such as pollens are generally incapable of control with respect to the individual patient whereas others such as feathers or animal danders are controllable. Ingestant allergens may often be detected and excluded from the diet. Five foods, milk, egg, wheat, orange and fish oil are unfortunately not only basic foods for the infant, but the most common sources of allergic manifestations in infancy. In the case of milk the allergen may be either the casein or the lactalbumin. Casein-sensitive patients do not benefit from change whether to human, cow or goat milk, as their caseins are so closely related, and heated or evaporated milk formulæ are not tolerated, and soy-bean milk must be substituted. Lactalbumin antigenicity is lowered by heating however and when evaporated milk is tolerated it should be continued until the end of the first year when absorption of undigested protein through the intestinal tract is less likely to occur. Egg white is the most difficult of all proteins to digest completely, and may circulate undigested in the blood of some infants. Heating does not denature it, and undigested egg protein in the circulation facilitates sensitization in the potentially allergic infant. Wheat is also a ubiquitous allergen and its presence in numerous infant foods is often unrecognized. It rarely produces the acute reactions which may often result from egg. A food that is accepted without reaction for the arbitrary test period of 14 to 21 days may become allergenic by continuous or frequent ingestion. In the case of cereals therefore, as well as vegetables and meat, varieties should be rotated. Rice as the least antigenic is preferable for the introduction of cereals to the diet. On account of the possibility of reaction to orange, or even to the artificial colouring often employed, vitamin C should be given as ascorbic acid and synthetic A and D in place of fish oils to the potentially allergic infant to the end of the first year. Combinations of vegetables should be avoided, and new foods given singly in pure forms, for instance wheat as cream of wheat, egg at first as hard boiled yolk, beef as beef juice, and additions of new varieties such as another vegetable, cereal or egg white only after a trial period of 2 to 4 weeks.

D. E. H. CLEVELAND

Industrial Medicine

Psychiatry as Applied to Occupational Health. Stewart, D.: *The Lancet*, 1: 737, 1948.

The achievement of harmony between the capacities of any individual and the demands of his occupation, which is the concern of occupational health depends on qualities of mind and temperament as well as on organic health. These individual psychological differences in normal people compel attention in industry through their practical consequences. The industrial psychologist has done work of much significance in resolving current industrial problems but in the opinion of the author, the work of the psychologist alone is not enough; the medical approach also is important. He feels that what industry increasingly requires is a doctor versed in both industrial and psychiatric matters and who talks the common language. The study of occupational circumstances by students of social pathology is also important.

In this article the author presents his opinions as to how psychiatry could be applied to the following problems in their relation to occupational health: selection for occupation, rehabilitation and resettlement, the young worker, training in industry, and, morale in industry. Planned schemes of selection for occupation are suggested; these would result in reduction in labour wastage, and absenteeism, combined with greater

efficiency of the individual and increased output. As no artificial division should be made between psychological and physical capacity, doctors in industry need to develop psychological insight into the material with which they are dealing. Working partnerships between medical officers and psychologists offer an interim answer to this problem. Proper resettlement of disabled persons is a major responsibility of any occupational health service. Reference is made to a planned scheme for rehabilitation as experienced by the Austin Motor Company. Finding the job into which a young worker can be fitted follows assessment of his physical and psychological characteristics. His school record can have a direct bearing on this. Progress through various jobs is a matter for management but help is required from the doctor with knowledge of the associated human problems.

The field of technical training in industry has recently created widespread interest and present trends show a potential relationship between future developments there and the subjects of psychiatry and occupational health. Reference is made to a recent report of a special committee appointed by the Minister of Education for Great Britain, which suggests a syllabus of training for management. In addition to subjects relating to technical, business and commercial fields, it includes those relating to health, welfare, safety and psychology. The importance of morale is also stressed. It is now coming to be understood that efficiency and high productivity depend on industrial morale no less than on mechanical equipment. For that reason an understanding of the factors influencing morale is important. The Hawthorne experiment carried out recently at the Western Electric Company's Hawthorne Works in the United States, made a very significant contribution to this problem. The author maintains that the application in industry, of incentives, which influence the individual, would do much to improve relationships and encourage mutual trust between management and employees.

MARGARET H. WILTON

The Advantages of Adequate Health Service in Industry. Gray, A. S.: *Connecticut Health Bull.*, 62: 151, 1948.

That a good program in industry is an important contributing factor to increased production, was proved during the recent war. Maintenance of the high production level attained during that period, is essential now to the nation's economy and to the world's needs. With this end in view, the author of this article reviews the advantages derived from an adequate industrial health service. He refers to the findings of the National Association of Manufacturers in their survey of more than one thousand industries. Of 806 companies, 92% said that their medical service had reduced occupational diseases; 234 companies reported an average reduction in absenteeism of practically 30%. Nearly 90% of 824 returns showed a reduction in labour turnover.

An adequate health program should include: physical examination—pre-placement, periodic and terminal; maintenance of confidential medical records; treatment of industrial injuries and emergency treatment of non-occupational diseases; consultation and advisory service for employees; scrutiny of unusual absenteeism; health education relative to the materials and conditions of their working environment; and maintenance of an adequate record system which can be utilized to determine the extent and cost of the service. The author stresses also the important rôle of the industrial physician, both "full-time" and "on call". The newest development for the provision of adequate medical services in small industries is the employment of a full-time industrial physician by a number of small industries in the same area. He devotes the necessary number of hours a week to each plant in the group. This plan is proving very successful in Connecticut at the present time. The importance of training physicians in industrial medicine has been recognized by a number of American Universities which have established foundations and fellowships in this specialty.

MARGARET H. WILTON

OBITUARIES

Dr. Crichton Alison, of Toronto, aged 58, died on December 28 after a brief illness. Born in Scotland, he practised medicine in London, Eng., for several years. He retired two and a half years ago and came to Toronto. He is survived by his widow.

Dr. Frederick James Donevan died on December 10 at his residence in Oshawa. He was in his 69th year. Born at Gananoque on July 18, 1880, he received his early education at Gananoque public and high schools, and graduated in medicine from Queen's in 1907. Following completion of his intern work at the Civic Hospital in Ottawa, he practised at Seeley's Bay and later at Smiths Falls. During World War I he served four years with the R.C.A.M.C. On his return he set up practice in Oshawa. Dr. Donevan took an active part in the development of the city's educational facilities, being a member of the board of education continuously for 22 years. Survivors are his widow, one daughter, one sister and two brothers.

Dr. Edmund Ennis of Bedford, N.S. died on November 20 in the Halifax Infirmary. Surviving, besides his widow, are two nephews and a niece.

Dr. Stuart Evans of Ottawa, died suddenly in the Civic Hospital on November 23. He had practised in Ottawa since 1905 and at the time of his death was consulting surgeon at the Ottawa Civic Hospital. For a number of years he was associated with the County of Carleton General Protestant Hospital and had been on the staff of the Civic Hospital since its inception in 1924. Dr. Evans was born and educated in Montreal. He graduated in medicine from McGill University in 1902 and then took postgraduate studies in New York and Edinburgh, Scotland. He had taught school for four years prior to entering university. His chief hobby was the farm he owned near Waltham, Que. He was also a member of the Masonic Order, the Canadian Club and the Wellsboro Fish and Game Club. He is survived by one son, Dr. Courtenay Evans, and three grandchildren, of Ottawa.

Le Dr J.-C.-E. Forest est décédé récemment en sa demeure à Montréal à l'âge de 61 ans. Il avait fait ses études au collège de l'Assomption et à l'Université Laval. Il laisse son épouse, un fils, un frère, et une sœur.

Dr. E. J. Gray, of Vancouver, died recently after a long illness. Dr. Gray was on the staff of St. Paul's Hospital and has practised in Vancouver for 38 years. His loss is keenly felt by all who knew him. He was a Knight Commander of the Order of St. Gregory, and was admitted to this by Papal Order several years ago.

Dr. Hubert Douglas Hamilton, who was retired director of the department of oto-laryngology of the Montreal General Hospital, died Christmas day after a lengthy illness. He was in his 84th year. Dr. Hamilton was born on September 22, 1865, in New York City. He took his B.A. and M.A. degrees from Bishops University and graduated from McGill University School of Medicine in 1889. In 1898 he was appointed director of the department of oto-laryngology at the Montreal General Hospital. He retired from that position in 1928. A prominent Mason, he was the oldest living past master of St. Paul's Lodge No. 374ER and had been honoured with the Overseas Grand Rank. He was an honorary member of St. George's Lodge No. 440ER and a member of the Ancient and Accepted Scottish Rite. He was a life member of the Royal St. Lawrence Yacht Club and the M.A.A.A. and a member of the Montreal Hunt Club, the University Club and the St. James's Club.

Survivors include two brothers, five nephews and one niece.

Dr. Josephine J. K. Kamm, of Odessa, Ont., died in hospital in Kingston on December 20. Brought up in Kingston, she graduated from Edinburgh University and was senior anaesthetist at Toronto General Hospital for some years. She was also active in public health work in several provinces. She is survived by three sisters.

Dr. Frank Martin died at his home in Dundalk, Ont., on December 31, at the age of 85. He was one of the vanishing race of general practitioners and served this community as a family doctor since 1894. Born in Garafraxa Township he received his early education in Fergus. Graduating in Applied Science from the University of Toronto in 1884, he went west with government survey parties. In the Riel Rebellion of 1885 he was a scout attached to the Royal Northwest Mounted Police. On his return from the West he entered the university as a medical student and graduated in 1893. He was an intern at the Hospital for Sick Children and Toronto General Hospital. After practising briefly in Erin he came to Dundalk in December, 1894, and practised here until his death. Dr. Martin was Medical Officer of Health for Proton Township and Dundalk. He was a past chairman of the high school board and library board and on honorary member of the session of the Dundalk United Church. He is survived by three daughters.

Dr. Graham L. McDougall died in Whitby, Ont., on December 1 in his 72nd year. Born near Brampton, he graduated in medicine from the University of Toronto in 1910, and first practised at Harriston. He came to Whitby 26 years ago and was a charter member of Whitby Rotary Club and a member of Composite Lodge A.F. & A.M. In 1946 he was chosen the "doctor who had done the most for medical science at that time" by members of district 5, Ontario Medical Association. Surviving are his widow, one son, Dr. Graham McDougall, Valleyfield, Que., and a sister.

Dr. Gregor William McGregor died on December 17 at his home in Toronto. Born in Claude, Ont., he attended Brampton High School and graduated in medicine from the University of Toronto in 1925. He then did postgraduate work in ear, nose and throat surgery at Harvard and had been a practising surgeon here for the past 20 years. Dr. McGregor served on the staff of the Toronto General Hospital. He was a member of the Canadian Medical Association, the Academy of Medicine of Toronto and the American Academy of Oto-laryngology. Surviving are his widow, two daughters, a son, a sister and a brother.

Dr Louis-Eugène Parrot est décédé le 18 novembre à Québec, à l'âge de 76 ans. Né à St-Emile de Lotbinière, il fit ses études médicales à l'université Laval, et décrocha son doctorat en médecine en 1897. Il se rendit à Paris en 1905 pour y parfaire ses études, puis il revint s'établir à Rivière-du-Loup, où il fonda l'hôpital actuel. En 1915, il fut élu député de Témiscouata pour demeurer jusqu'en 1922.

Outre son épouse, il laisse trois fils, une fille et deux sœurs.

Dr. W. C. Redmond of Edmonton passed away on January 3, after forty-one years of practice. Dr. Redmond was born in Picton, Ont., seventy-three years ago. He graduated from Queen's University and for a short time practised at Westwood, Ont., following which he came to Edmonton in 1903. Dr. Redmond played an active part in medical and church work in Edmonton and was a member of the Board of the Misericordia Hospital. He was a life member of the Masonic lodge. He leaves a widow and two sons.

Dr. Robert Francis Rorke, a pioneer in the establishment of public baby clinics in Winnipeg, died on December 15 at his home at the age of 84. Born in St. Thomas, Ont., he graduated from McGill in 1893,

and in postgraduate work obtained the M.R.C.S., L.R.C.P., London. He spent several years in postgraduate work in Boston and Vienna. In 1905 he came to Winnipeg and soon established a reputation as a paediatrician. In conjunction with the late Dr. E. Richardson he started the free clinic for babies and a babies' milk depot at Logan Avenue in 1908. Later the milk depot was taken over by the city, but Dr. Rorke continued as its head. In 1919 he was appointed Lecturer, and from 1920 to 1930 he served as Associate Professor of Paediatrics. From 1909 to 1932 he served on the staff of the Children's Hospital and in 1934 he was appointed Physician Emeritus, and for the years 1922 to 1931 he was Paediatrician at the Winnipeg General Hospital. On his retirement he was placed on the Honorary Consulting Staff. Dr. Rorke saw the city's infant mortality rate drop from 120 per 1,000 in 1912 to about 30 per 1,000 in recent years, and he could justly claim credit for the reduction. To be able to instruct new Canadian mothers he learned to speak several languages. He combined a wealth of scientific knowledge and clinical experience with true nobleness of spirit.

He is survived by a son, a daughter, a brother and two sisters.

* * *

AN APPRECIATION

The death of Robert F. Rorke marks the passing of another notable physician in the annals of Canadian medicine. He was the oldest active practitioner in Winnipeg. On the afternoon of his death, a day of heavy snow and the worst driving conditions of the winter, he had made a call to see a sick child of a very poor family in the suburbs and when he returned home, he remarked that he did not think he should dare go out again that evening. A moment later, with his overcoat still on, he collapsed and was almost immediately dead. Such an ending would have been regarded by him, and no doubt by most of us, as a perfect one. The episode depicts his devotion to his professional duties and is an example of his whole life.

Not only was he the oldest practitioner in Winnipeg, he was also the oldest paediatrician in Canada and his interest in paediatrics dated back to a long stretch of postgraduate work in Vienna, Germany and London at the turn of the century. From 1904, when he settled in Winnipeg, he was recognized as the outstanding local authority in the diseases of childhood. His "wee" clinic was the nucleus from which the Children's Hospital of Winnipeg originated. He was head of the department of paediatrics in the Medical College from 1922-34. He was able to watch the forward march of medicine and his own specialty over a period of 50 years. He never took an active part in society or contributed to the journals. This was regrettable but such was his nature. This fact makes it fitting to bring to the attention of the profession what a great reader of medicine he was; what a profound knowledge of medicine he had, based on a thorough study of pathology, bacteriology and basic sciences as existed in his early days when he worked in the same laboratories as Landsteiner and Von Pirquet. His contemporaries, in the hey-day of his activities freely admitted his profound knowledge and authority.

He was predeceased by his wife by 8 years. She was a brilliant lady actively interested in affairs and for several terms a member of the school board of the city of Winnipeg. There were no children of their own, but two children, by adoption, brother and sister, have grown up to adult life and are living proof that environment plays a goodly part in development for they have provided his greatest peace of mind since the loss of his wife.

There is one interesting study about Dr. Rorke which is worthy of comment; that whereas he was somewhat removed from active medical politics, he held very strong opinions in matters of parliamentary politics. He was a dyed-in-the-wool conservative and an imperialist and

he adhered to these opinions strongly. He had no great admiration for anything out of the U.S.A., which partly explains why his medical reading was largely British or German.

I have deliberately refrained from extolling his character and virtues. Readers may take it for granted that his life was *sans peur et sans reproche*.

O. J. DAY

Dr. William M. V. Rynard, aged 49, died on December 24 in Stamford, Conn., where he had practised for the last 20 years. Dr. Rynard, a graduate of the University of Toronto, was born at Baldwin, Ont. He is survived by his widow, a son, and a daughter.

Dr. A. Primrose Wells died in Duncan, B.C., on December 5, at the age of 94. During his long career as physician and surgeon Dr. Wells was medical officer on a White Star liner plying between Britain and India, and surgeon to the governor of the Isle of Man. Born in Chelmsford, England, he studied at Repton, Cambridge and St. George's Hospital, London, taking the degrees of M.R.C.S. and L.R.C.P. In 1911 he came to Canada, settling first at Creston and then Victoria. During the First Great War he volunteered for service, and was assigned to the White Star liner. He returned to Victoria in 1919 and practised here for several years later moving to Duncan. Surviving are three daughters and two sons.

NEWS ITEMS

Alberta

The Annual Edmonton Academy of Medicine banquet was held in the Macdonald Hotel in December. The main speaker of the evening was Professor M. Huson of the University of Alberta. His topic "On how not to speak in public" was charming and illustrative.

Dr. Charles Allard, who recently obtained his Fellowship with the Royal College of Surgeons of Canada has taken up his practice in the City of Edmonton.

Among the medical profession who holidayed for the Christmas season on Vancouver Island were Dr. and Mrs. E. L. Pope with Dr. and Mrs. Harold Orr.

The continued fine weather in Alberta has allowed many medical men to attend to their curling activities and at present a number of "medical rinks" are doing well.

Dr. L. Kiekham of Westlock was an attendant at some of the recent clinics held in Edmonton, a schedule of which is to appear in the *Alberta Medical Bulletin*, so that men from the various towns may know what is going on, medically, when visiting Calgary or Edmonton.

A ten-student teaching microscope has been added to the department of pathology at the University of Alberta.

W. C. WHITESIDE

British Columbia

The Provincial Hospitalization Plan went into operation on January 1 and everyone is anxiously watching to see how it will work out. The British Columbia Hospitals Association promptly announced an increase in rates, which will no doubt be the basis of payment from the Fund. Public ward rates have risen from \$6.00 to \$8.00 per diem, and semi-private and private ward rates rose in proportion.

One or two straws have already moved enough to indicate some wind-pressure. One or two patients to our knowledge have declined, or at least been unwilling to leave as soon as their doctor thought it safe, since home conditions were not, in their opinion at least, favourable to their well being. This will, we believe, be one of the major problems confronting the Board, but indications are that this has been to some extent provided for. But an increase in hospital days will, of course, mean a further curtailment of our already far too limited hospital space.

The staffs of Shaughnessy Hospital, the D.V.A., the Vancouver General and St. Paul's Hospitals, have arranged a postgraduate course for general practitioners, to begin in March, and to last for two weeks. A similar course was given last year and was extremely popular. This one should attract a great many men, as it is packed with good things, and covers a great range of subjects. There are lectures and clinics and the course will be limited to fifty registrants.

The John Mawer Pearson Memorial Lecture was delivered on December 7, by Dr. J. S. L. Browne, Professor of Clinical Research of McGill University, at the Jubilee Dinner of the Vancouver Medical Association. This was held at the Hotel Vancouver, and there was a large attendance, over 250 being present. Dr. Browne's subject was "The Response of the Adrenal Cortex to Disease and Injury in the Human".

This is a difficult subject, and it is impossible to make it exactly easy to listen to, but Dr. Browne's presentation of it came as near realization of such an aim as could be done by anyone. His paper was most fully illustrated by graphs and slides, and as he showed these his running commentary gave a coherent picture of his theme. It was stimulating and refreshing to be taken, as it were, behind the scenes, and see something of the vast amount of research work that is going on, and must continue to go on if medicine is to advance; and every one of his audience, we are sure, felt deeply grateful to Dr. Browne for this personally conducted trip backstage. The lecture was the first Pearson Lecture, and hit exactly the right note, as this sort of thing would have entirely appealed to the man whose memory it commemorated.

Dr. O. O. Lyons of Bowell River, where he has been in practice since 1928, has left Powell River to take up practice in Vancouver. Dr. Lyons was immensely popular and his departure brought out many expressions of regret.

Dr. Andrew M. Davidson, formerly Head of the Department of Dermatology at the University of Manitoba, has moved to Vancouver, where he will carry on private practice in his specialty.

The B.C. Division of the Canadian Arthritis and Rheumatic Society is going ahead with a plan for treatment and research, subject to the approval of the B.C. Government. This plan includes centres for B.C. for research and diagnosis; a rheumatic fever clinic at the Vancouver General Hospital; mobile physiotherapy units; and the placing of special diagnosis and therapeutic facilities at the disposal of general practitioners throughout the Province.

J. H. MACDERMOT

Manitoba

The medical staff of the Winnipeg General Hospital entertained one of their number, Dr. Harold V. Rice, on December 14 at the Manitoba Club. The occasion was his impending departure for Edmonton where he will be professor of physiology in the University of Alberta. By his research work in electroencephalography, Dr. Rice has made a distinct contribution to the scientific aspects of medicine. In addition he was energetic in organizing the Winnipeg Symphony

Orchestra which gave its initial concert on December 16. For both reasons he will be greatly missed in Winnipeg.

Dr. Athol R. Gordon of Winnipeg has been appointed deputy provincial coroner, effective December 15, in succession to Dr. E. K. Vann who has resigned.

Money by-laws will be voted on in four rural municipalities and one village to authorize the formation of the Hamiota hospital district, under the Manitoba Health Services Act, at a total cost of \$205,000. Under the scheme a 26-bed hospital would be established at Hamiota at a cost of \$145,000 and three nursing units would be set up at a cost of \$20,000 each at Oak River, Miniota and Kenton.

ROSS MITCHELL

Nova Scotia

A conference held between representatives of the Medical Society of Nova Scotia and the group sponsoring a co-operative medical scheme in New Waterford apparently ended in a stalemate. The Society stands on the principles that individual enterprise and initiative on the part of physicians promote better standards of practice, and that the patient should have free choice of his physician. The scheme proposed is at variance with these fundamental ideas. The local physicians have signified their unwillingness to practice under such conditions.

Dr. Bernard F. Miller has returned to Nova Scotia following graduate work in orthopaedic surgery in England. While there he received his Fellowship from the Royal College of Surgeons, Edinburgh. His present plans are to practise in Halifax. Prior to the war he practised in New-Waterford.

Dr. S. T. Laufer of Halifax has been made a Fellow of the American College of Physicians.

The Provincial Medical Board met at Halifax in December. Dr. J. G. MacDougall was re-elected President. Drs. MacDougall and H. K. MacDonald were appointed its representatives on the Medical Council of Canada for the ensuing term of office.

The many friends of Dr. H. K. MacDonald, Halifax, who was severely injured when struck by a car several weeks ago will be glad to hear that he is making favourable progress though still in hospital. Other physicians laid up through illness or accident and doing well are Dr. H. A. Fraser, Bridgewater, Dr. C. M. Donkin, Bridgewater, Dr. J. W. Reid, Truro, and Dr. W. H. Eagar of Wolfville.

H. L. SCAMMELL

New Brunswick

At the annual meeting of the Saint John Branch of the Associated Alumni of Acadia University, Dr. Frank D. Wanamaker, was elected President, and Dr. G. W. A. Keddy as Treasurer, for 1949.

The King's County Medical Society met in the Memorial Hospital, Sussex, December 1 and elected officers for 1949 as follows: *President*—Dr. A. L. Winsor, Norton; *Vice-president*—Dr. T. S. Dougan, Sussex; *Secretary*—Dr. H. R. Bryant, Sussex; and Dr. A. W. Clark was elected to represent the society on the executive committee of the New Brunswick Medical Society. The chief topic of discussion was the Provincial Cancer Diagnostic Clinics.

Dr. G. C. B. Gaulton is now associated in practice with Dr. Robt. Hayes, specializing in eye, ear, nose and throat diseases.

Dr. L. H. Freedman of Saint John, was appointed to the anæsthetic staff of the General Hospital, at the last meeting of the Hospital Board of Commissioners.

Dr. F. Graham Knoll, was elected President of the Saint John Branch of the St. Francis Xavier Alumni Society at the annual meeting. Dr. F. H. George was elected to the executive.

Dr. Jean MacDonald, of Moncton has been appointed to the Department of Gynæcology of the Victoria General Hospital in Halifax.

Dr. H. S. Everett, of St. Stephen, is in Montreal, making a special cytological study in the diagnosis of cancer. This study is made possible by a scholarship provided by the New Brunswick Cancer Society.

A special meeting of the Saint John Medical Society was called in December to discuss the best way to employ the federal grant to the Province of New Brunswick for the treatment of crippled children. It was felt that the special demands in accepting this grant and its expenditure before March 31, 1949 placed the provincial government and the medical profession in a very difficult situation. Any part of this grant not expended at March 31, 1949 was not available as a carry-over into the fiscal year of 1949-50. Haste is apt to cause error and discussion centred on this point. It was the general opinion that the Health Survey should have preceded the treatment grants but efforts were to be made to co-operate as fully as possible with both provincial and federal departments of health. The visit of Hon. Paul Martin to the province at the time of these discussions gave opportunity for first hand information.

Dr. H. A. Farris, discussed the diagnosis, pathology and treatment of coronary thrombosis at the regular December meeting of the Saint John Medical Society. The large audience enjoyed the paper and particularly the common sense approach to the subject by the senior cardiologist of Saint John.

Dr. C. R. Baxter, of Moncton received a fellowship in the International College of Surgeons at the annual meeting in St. Louis, recently. A. S. KIRKLAND

Ontario

Dr. Clifford Herbert MacNeill has been appointed deputy physician in charge of the tuberculosis pavilion, Christie Street Hospital. A Queen's graduate of 1929 he carried on a general practice in Campbellford until he joined the Army in 1940, he was stationed at Petawawa for a year, overseas for three years then another year at Petawawa, attaining the rank of Major. He was on the staff of the D.V.A. Hospital in Peterborough until it was destroyed by fire. He then was with the tuberculosis patients at Kingston and was acting superintendent of the Veterans' Hospital, Kingston, until the Eastern Counties took over the hospital.

Dr. A. A. MacVicar is practising in Port Elgin, New Brunswick, and not in Port Elgin, Ontario, as was stated in the December *Journal*.

Dr. W. Ford Connell, professor of medicine at Queen's University, is confined to the Kingston General Hospital with a coronary thrombosis. At the present time he is showing definite improvement.

A seminar on Physical and Clinical Aspects of Hearing was held by the Physiological Society of the University of Toronto. The speakers were: Drs. P. E. Ireland, J. T. A. Sullivan and S. J. Hughes of the department of otolaryngology and Dr. C. C. Gotlieb and Mr. W. E. Hodges of the otological and audiometric laboratory of the department of physics.

In 1947 there were 208 deaths from tuberculosis among Toronto citizens representing a rate of 29.9 per 100,000 of the population.

The Veterans' Hospital at Kingston has been taken over from the D.V.A. and will be operated by a private board as a sanatorium named Ongwanada (Indian for "Our Home"). Dr. Bruce H. Hopkins is the medical superintendent.

More than a quarter of the population of Ontario, about 1.3 million people are enrolled in the Blue Cross Hospital Plan. Up to now the plan has been confined to group enrollments but individuals are going to be taken on as subscribers.

The Minister of Health has appointed Mr. Arthur J. Louks, Campbellford, to be a member of the Board of Examiners in Optometry in place of Dr. A. Lloyd Morgan, resigned.

In a recent item in this column the costs for the care of adult patients in the public wards of the Toronto General Hospital was given as \$5.91 in 1947, to this should be added 35 cents for the cost of x-rays, bringing the daily cost to \$6.26. Similar costs in other Toronto hospitals are: St. Joseph's \$5.44; St. Michael's \$6.11; Toronto East General \$6.43; Wellesley \$6.75; Toronto Western \$7.08; Women's College \$7.36; Mount Sinai \$7.77; Sick Children's \$8.44.

LILLIAN A. CHASE

Prof. Tracy Mallory, Pathologist-in-Chief, Massachusetts General Hospital, Associate Professor of Pathology, Harvard Medical School addressed the Academy of Medicine, Toronto, on January 4. His subject was "Liver Biopsy in the Diagnosis and Investigation of Cirrhosis in Man".

On November 30, 1948, Professor C. H. Best, University of Toronto, was made a Commander of the Order of the Crown of Belgium. Dr. Best already holds with many other honours an honorary degree from the University of Louvain.

At a dinner meeting called by the County of York Law Association on November 18, it was decided to form a Medico-Legal Association and committees were appointed to draft a tentative constitution and elect officers.

The teaching staff of St. Michael's Hospital, Toronto, will hold a course there on January 27 to 29 for those interested in general problems of medical practice.

Dr. J. T. Earl has commenced practice in Port Elgin, Ont. He previously practised in London, Ont.

Dr. W. G. Grant has joined the clinic in Brooklin, Ont.

Dr. William Cardwell is now superintendent of the Ontario Hospital at Penetanguishene, Ontario.

NOBLE SHARPE

The University of Toronto, Faculty of Medicine, has announced that Dr. J. C. McCulloch has been awarded the Reeve Prize; this award is made for the best scientific research accomplished in any department in the Faculty of Medicine by one who has held an appointment on the staff for not more than five years.

Dr. McCulloch was awarded this prize for his study in conjunction with Dr. R. J. P. McCulloch on "A Hereditary and Clinical Study of Choroideræmia"; this has added greatly to the knowledge of the previously obscure hereditary ocular condition. The disease was found in over 80 descendants of a family of 500 individuals who were studied.

Dr. J. C. McCulloch is Ophthalmologist-in-Chief at Toronto Western Hospital and was recently appointed Associate, Department of Ophthalmology, in the University of Toronto.

Quebec

Dr. D. C. Bews, an associate professor in the faculty of medicine at McGill University, has been appointed assistant medical director of the Bell Telephone Company of Canada and will assist in the co-ordination of health services in the company's eastern area. A native of Kingston, Ont., and a graduate in medicine of Queen's University, Dr. Bews also completed postgraduate studies in public health at the University of Toronto and in tropical medicine at McGill University. Going to the Far East in 1937, he became superintendent of the Kareyawa Sanatorium in Japan and later served in the same capacity at the Mackay Memorial Hospital in Formosa, returning to Canada before the outbreak of war with Japan. Commissioned in the R.C.A.M.C., he served in Canada and the Far East until 1946 when he became assistant professor, department of health and social medicine, at McGill.

Le professeur agrégé Charles Lefrançois a été élu chef du service de chirurgie à l'Hôtel-Dieu de Montréal; il remplace M. Armand Paré, démissionnaire.

Le docteur Diomède Guertin, de Québec, qui avait dirigé pendant la guerre la section neuro-psychiatrique du centre de mobilisation de New-York, a pris la direction du Foyer pour épileptiques de Skillman, N.-J.

Les annexes dont la construction est en voie d'achèvement porteront la capacité du Sanatorium Cooke, aux Trois-Rivières, à 350 malades, et celle de l'Hôpital Sainte-Thérèse, à Shawinigan, sera augmentée de 25 lits. On commence également des travaux d'agrandissement à l'Hôpital Saint-Joseph de Rimouski.

Work now being undertaken will soon double the size of the School for Nurses at the Herbert Reddy Memorial Hospital in Montreal. Improvements to the school, which is not yet three years old, will be made possible in part by a grant from the Federal Department of Health and Welfare.

At the Halifax meeting of the Canadian Association of Radiologists, early in January, Dr. D. L. McRae, radiologist to the Montreal Neurological Institute and to the Children's Memorial Hospital, gave a paper on Blount's disease.

Il nous a fait grand plaisir de recevoir les quelques premiers numéros de l'*Information médicale et paramédicale*, journal bi-mensuel que dirige M. Roméo Boucher, médecin-chef de l'Hôpital Saint-Luc de Montréal. Ce journal, qui sera adressé à tous les médecins de la province, nous a déjà permis de lire plusieurs textes intéressants de médecins de France et du Canada.

PAUL DE BELLEFEUILLE

General

Medicine of the Year.—It has been found necessary to make some changes in the plans for this projected publication. The review will appear in the Spring, published by Lippincott's, but to those whose subscription is received later than January 12, the review will be in a different format and at a somewhat higher price.

Twelfth British Congress of Obstetrics and Gynecology.—This congress will be held in London, England, on July 6, 7 and 8, 1949. There will be a closing banquet in the Guildhall on Friday evening. Those who wish to attend are advised to make their reservations as

early as possible. The Honorary Secretary is Dr. Ian Jackson, M.R.C.O.G., 58 Queen Anne Street, (Royal College of Obstetricians and Gynaecologists), London, W.1.

Third Inter-American Radiological Congress.—The third congress of radiology will be held in Santiago, Chile, from November 11 to 17, 1949. This is sponsored by the Chilean Government, and the official scientific subjects will cover the cardiovascular system, the skull, and radiation treatment of cancer. Enquiries should be sent to Dr. César Velasco U, Casilla 693, Santiago, Chile.

The officers of the **Canadian Society of Obstetricians and Gynaecologists** for 1948 and 1949 are as follows: *President*—Dr. J. Ross Vant, Edmonton, Alberta; *Treasurer*—Dr. R. T. Weaver, Hamilton, Ontario; *Secretary*—Dr. J. O. Baker, Edmonton, Alberta.

It is proposed to hold the next annual meeting June 18 to the 22, at Jasper Park Lodge, Jasper National Parks.

Canadian Tumour Registry Created.—Establishment at the federal Laboratory of Hygiene, Ottawa, of a central tumour registry to assist in the general program of the National Cancer Institute of Canada has been announced. Providing scientific facilities for the war against cancer, the government has approved expenditures for the creation and functioning of the registry. Staff is now being appointed, and necessary equipment and supplies are on order.

The National Cancer Institute of Canada has named Dr. Desmond Magner, professor of pathology at the University of Ottawa, as registrar of the new establishment, and the minister of National Health and Welfare is making available the services of two health officials, Dr. H. A. Ansley, assistant director of health services, and James Gibbard, B.S.A., M.Sc., chief of the Laboratory of Hygiene, who will be associated with Dr. Magner in administering the registry. In addition to other work in this field, the registry will assist pathologists in the classification of various cancers and other tumours and will collect case histories and other relative data for future studies. A panel of leading consultants from all across Canada has been appointed to act as a technical group for the classification of tumours.

BOOK REVIEWS

Modern Trends in Diagnostic Radiology. Edited by J. W. McLaren, Director, X-ray (Diagnostic) Department, St. Thomas's Hospital, London. 464 pp., illust. \$18.00. Butterworth & Company (Publishers) Limited, London, 1948.

This book covers some of the most important advances in diagnostic radiology in the past decade and therefore is of particular interest to practising radiologists. Twenty of the thirty-one chapters are contributed entirely by radiologists of Great Britain, while the remainder are written wholly or in part by European, North American or other authors including Baclesse of Paris and the late Professor Lysholm of Stockholm. Especially well presented are the following special subjects, sarcoidosis, fetal abnormalities and kymography. Thought-provoking articles on unusual aspects of diagnostic radiology such as radiology in research, blood changes from x-radiation and the medico-legal aspect of the specialty are included in the text. Modern trends in diagnostic cardiology, gastro-enterology and diseases of the chest are also on the whole well covered but more space might have been given to angiocardiology. The treatment of the various subjects seems to have been left largely to the individual contributors and naturally the style is not uniform.

The illustrations are of excellent quality. The bibliographies on the whole are adequate and the general format is attractive. This volume will find a useful place in the libraries of radiologists.

Pathology of Tumours. R. A. Willis, Sir William H. Collins Professor of Human and Comparative Pathology, Royal College of Surgeons, London. 1068 pp., illust. \$19.00. Butterworth & Co. (Publishers), Ltd., London and Toronto, 1948.

The author of "The Spread of Tumours in the Human Body" has produced a new work of the first magnitude in which the vast field of oncology is expertly and competently covered. The book is divided into two sections. The first, of 206 pages, deals with the general pathology of tumours and includes such topics as classification, innocence and malignancy, experimental cancer research, statistical methods applied to tumour study, animal tumours and the mode of origin, method of growth and spread of tumours. Part II, the greater portion of the book, is concerned with a systematic and regional discussion of tumours. The various chapters are well-organized in a standardized pattern. The textual material is considered under such headings as frequency, age and sex incidence, causative factors, the mode of origin, the structure, growth, direct spread and metastasis. The book is profusely illustrated mainly with well-reproduced microphotographs from cases personally studied by the author, while the bibliography at the end of each chapter is well arranged with the references considered to be most useful, printed in bold type. All of the common tumours, as well as many of the more unusual types, are discussed; in fact, as the author states, since the book is not intended primarily for beginners in the field, he devotes more time and interest to the uncommon and poorly-understood tumours than to those commonly encountered in practice. Professor Willis's style is clear and concise, and there is never any doubt in the reader's mind as to where the author stands on numerous controversial and highly-contested points. The work reflects very definitely the personal views of the author based in large part upon personally studied cases. A refreshing note is the bluntness with which he strips away and discards much that is unnecessary and obscure in the classifications that have grown up around many tumours. His views on a number of subjects are distinctly at variance with those of the majority of workers in the field, but errors and misstatement of facts are few and far between.

It is impossible to do justice to this book in a short review. However, it may be confidently asserted that it is in every respect superior to previous works on the subject, and such valid criticism as may be made does not detract in any significant degree from its great value. The Pathology of Tumours is highly recommended both as a text and as a reference book for pathologists, students and in fact any person whose work touches upon any of the numerous facets of the problem of cancer.

Practical Therapeutics. M. E. Rehfuss, Professor of Clinical Medicine and Sutherland M. Prevost, Lecturer in Therapeutics, the Jefferson Medical College, Philadelphia; F. K. Albrecht, formerly Clinical Director, U.S. Marine Hospital, Baltimore, Md.; and A. H. Price, Assistant Professor of Medicine, the Jefferson Medical College, Philadelphia. 824 pp., illust. \$15.00. The Williams & Wilkins Co., Baltimore; University of Toronto Press, Toronto, 1948.

This is a good book which amply justifies the time and patient effort which the authors have devoted to it. Their attitude of directing the material for the student and busy practitioner is one which others might well emulate. Much as we all enjoy reading around a subject as well as on it, there is not too much time to do it. Here, excess verbiage has been

done away with and one can get the information rapidly and concisely. This reviewer particularly liked the excellent summary diagrams. The book is frighteningly large, as any comprehensive book on therapeutics must be, but it is not intended that it be read through from cover to cover. It is, essentially, a handy reference book. With this last fact in mind, there is one criticism that might be made, which is that the index is not sufficiently complete. Such a text, to be truly useful, must have a full cross index so that any item may be readily found. If the authors can be persuaded to tie themselves to the drudgery of keeping the material up to date with constant revision, this book should become a standard reference.

Psychiatry in a Troubled World. W. C. Menninger, General Secretary, the Menninger Foundation, Topeka, Kansas. 636 pp. \$6.00. The Macmillan Co., New York and Toronto, 1948.

This book is a monument to the energy and sense of responsibility of the author. It tells the story of the development of a highly effective psychiatric medical service, with emphasis upon the problems and results as shown by the records of an 8,000,000 man army, and as seen by an experienced psychiatrist, who was responsible for the direction of the service. Other surveys and histories will be written, but this volume has the outstanding virtue of having been completed while the material was fresh and at the hand of the author who is best able to provide emphasis if not the perspective of time.

The first part is directly concerned with the war period, including sections on: Background, The Soldier, Clinical Observations, Administration and Practice of Army Psychiatry. Every chapter is fully documented, and as in all the book, many of the statistics are allowed to speak eloquently for themselves. The second part is a creditable attempt to apply the lessons of wartime psychiatry to post-war and peace-time conditions. The eleven chapters in this section touch upon almost all phases of our society except the former prisoners of war and the displaced persons, and will be of interest to all members of the medical profession who might not be concerned with the more detailed facts and technical points in the first part of the book. This volume is recommended to all psychiatrists for the reference value of the first part and the appendices, and to all those seriously interested in the development of an adequate medical service for the opinions expressed and the interpretations provided in the second part.

Sex Variants. G. W. Henry, M.D., with sections contributed by specialists in particular fields. 1130 pp., illust. Paul B. Hoeber, Inc., New York and London, 1948.

This is a one-volume edition of a monograph first published in 1941 in two-volume form under the auspices of the Committee for the Study of Sex Variants, Inc. Here are recorded histories, genealogical data, physical examinations, skull and pelvic x-ray studies, anthropological data and Terman-Miles masculinity-femininity tests on 80 sex variants. These are reported to be the most informative of over 200 cases who volunteered for this study. The personal histories are given in autobiographical style and are said to be composed almost entirely of statements made by the subjects themselves with a minimum of editing to make a connected story. The original histories were obtained by a modified free association method; two years later these statements were checked by means of the questionnaire method of interview.

The author of this prolonged and intensive study had had fifteen years of experience as a psychiatric consultant prior to his undertaking the investigation in 1935. Wisely, he offers no conclusions but records his impressions with a notable freedom from bias. Outstanding is his emphasis on mental hygiene aspects



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of sexual adjustment and the need for the individualization of sex education. The social side of the sex variant problem is frankly presented and measures for its management suggested. This is a preliminary report on a vast study. As such it achieves its modest objective and as such it is recommended to all those who are concerned with human relations.

American Medical Association Interns' Manual. 201 pp. \$2.50. W. B. Saunders Co., Philadelphia and London; McAinsh & Co., Ltd., Toronto, 1948.

In the preface to the first edition in 1932 the Council on Medical Education and Hospitals and the Council on Pharmacy and Chemistry of the A.M.A. stated that the Interns' Manual was designed to provide the intern with helpful suggestions as to conduct in the carrying out of his duties. It also included helpful information as to action and dosage of drugs, some basic laboratory data and brief notes on the diagnosis and management of cases of acute poisoning. The present volume is an attempt to bring the former edition up to date. It includes chapters on diet and nutrition and on physical medicine.

Medical Manual. W. R. Feasby, Medical Assistant to the Superintendent, the Toronto Western Hospital. 162 pp. \$2.25. University of Toronto Press, Toronto, 1948.

This is a handy little volume dealing with the everyday methods of treatment in general hospitals. Designed primarily for students and interns it contains much material which will be useful to the practising physician.

Blood Clotting and Allied Problems. Transactions of The First Conference, February 16 and 17, 1948, New York. Edited by J. E. Flynn, Department of Pathology, Columbia University, New York. 179 pp., illust. \$3.25. Sponsored by the Josiah Macy, Jr. Foundation, New York, N.Y.

This volume is a record of the transactions together with a report of discussions which took place. It is a reasonably complete discussion of the many problems presently occupying the attention of hæmatologists throughout the medical world today. It is a useful reference volume.

Hæmatology. C. C. Sturgis, Professor of Internal Medicine, Chairman of the Department of Internal Medicine, University of Michigan. 915 pp., illust. \$15.75. Charles C. Thomas, Springfield, Ill.: The Ryerson Press, Toronto, 1948.

This volume of 846 pages together with bibliography and index is a partial review of the extensive literature of blood dyscrasias. It differs from Wintrobe's classic in that no space is devoted to technique, but in other respects it is similar though somewhat less complete. There are a number of illustrations in colour which do not do justice to the original films. Chapters on sternal puncture, blood transfusions and blood substitutes conclude the volume.

New and Nonofficial Remedies 1948. Issued under the Direction and Supervision of the Council on Pharmacy and Chemistry of the American Medical Association. 800 pp. \$3.50. J. B. Lippincott Co., Philadelphia, London, Montreal.

This useful book is too well known to require any special introduction. It is safe to say that nothing else contains so much necessary information regarding the steady stream of new remedies. Many of these of course will fall by the wayside. Those that survive and hold their place in treatment eventually will not need further notice. In the meanwhile this book is invaluable in providing a safe guide. It does not necessarily include all that is of pharmaceutical worth, but it admits only what has been carefully appraised and accepted by the Council

of Pharmacy and Chemistry of the A.M.A. The section on penicillin is a remarkably complete summary of the present use of this substance and the same applies to the section on vitamins.

Pædiatric Anæsthesia. M. Digby Leigh, Director of Anæsthesia, Vancouver; M. Kathleen Belton, Supervisor of Pædiatric Anæsthesia, Vancouver. 240 pp., illust. \$5.50. The Macmillan Co., New York and Toronto, 1948.

This volume fills a present need for information regarding the conduct of anæsthesia in infants and children. Basic differences between adult and children's anæsthesia are well emphasized. The narrow margin of safety present in children, the necessity for reduction of dead space, and for elimination of resistance in the system used are repeatedly demonstrated. Especially important is the stress placed upon constant observance of minute detail. There is little to criticize in this volume. When considering upper respiratory obstruction, under anæsthesia, one common cause which has been omitted is a long flapping epiglottis which closes over the cords during forced inspiration. An oropharyngeal airway often accentuates such an obstruction. The advocacy of nitrous oxide in infants is worthy of emphasis. As the authors note, the reaction of these small patients to pain is less than normal, and often this non-toxic agent can be used with adequate oxygen to produce satisfactory analgesia. One must disagree with the technique for reduction of fractured noses. It is our feeling that the only way to handle these safely is to intubate before manipulation begins. It is felt that in bronchoscopy the combination of pentothal along with curare is most useful. This is not mentioned in the book. Finally, in the conduct of the anæsthesia for cleft lip, a useful sign of depth of anæsthesia, in addition to those pointed out by the authors, is the degree of tone of the hands of the infant. A loose, flabby hand is a sign indicative of unnecessary depth. A clenched hand without movement is a sign of adequate depth.

Techniques in Physiotherapy. Edited by F. L. Greenhill, Sister-in-Charge, Medical Rehabilitation Unit, Royal Free Hospital; assisted by C. B. Heald, J. N. Barron and J. Colson. 240 pp., illust. 12/6. Hodder & Stoughton Ltd., London, 1948.

This textbook is written for the benefit of students in physiotherapy, and it attempts to provide very specific treatments for those conditions usually seen in physiotherapy departments. The book is of no value to the average physician, as it has been written down to the technical level of the Physiotherapy Technician. Some of the treatments prescribed are questionable, although authorities are quoted in support of them. The book is written from the English viewpoint, and a number of conditions that are successfully treated in this country by physical methods, are omitted. In all, it can be considered a useful adjunct to a physiotherapy technician's library.

Treatment of Malignant Disease by Radium and X-rays. Ralston Paterson of Christie Hospital and Holt Radium Institute, Manchester. 622 pp., illust. \$11.25. Edward Arnold & Co., London; Macmillan Co. of Canada, Toronto, 1948.

The title sets forth very clearly the purpose of the books, namely to outline the treatment of malignant disease by means of x-ray and radium. The text is entirely confined to the practice of radiotherapy, as carried out at the Radium Institute of Manchester, under the direction of the author of the book, namely Ralston Paterson. The book should be of very great value to students and all radiotherapists, as the author goes very fully into the basic principles, and into details of treatment of each region of the body. This book is the most valuable one yet published on this particular subject and should be in the hands of every radiotherapist.

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Viral and Rickettsial Infections of Man. Edited by Thomas M. Rivers, Director of the Hospital, the Rockefeller Institute for Medical Research. 587 pp., illust. \$7.00. J. B. Lippincott Co., Montreal, 1948.

This book is from the pens of 27 different authors each of whom is an acknowledged authority on some aspect of viral or rickettsial infections. The main object of the book is to provide a practical approach to problems of prevention and treatment. Chapters are devoted to the control of human infections in the community, the identification of carriers, the rôle of immunization and chemo-prophylaxis. Other chapters deal with specific viral and rickettsial infections of which no less than thirty are discussed in some detail. The illustrations are excellent, as is the bibliography. The volume should prove valuable to any student of medicine who desires to bring his knowledge of this fascinating subject up to date.

Surgery. C. A. Pannett, Professor of Surgery, University of London. 769 pp., illust., 2nd ed. 27/6d. Hodder & Stoughton Ltd., London, 1947.

This book is in no way superior to any of the textbooks in surgery now available to students and it is felt that some of the important advances in surgery are left out and some outmoded forms of treatment are still included. However, the writing is lucid and the illustrations are good. The book might be used as an adjunct to the reading of any student commencing surgery.

Pharmacopœia and Clinical Methods of the Teaching Hospitals, McGill University. 201 pp., 5th ed. \$1.75 cloth; \$2.00 spirex. On sale at McGill University, Montreal.

This little volume holds a well earned place in hospital pharmacopœial literature. In the eight years since its last edition there have been great developments in therapeutics and many changes have been made in order to

incorporate them. Several sections have been entirely re-written and some obsolete material omitted. It can be recommended as compact, complete and authoritative.

Tuberculosis in Young Adults. Report on the Prophit Tuberculosis Survey 1935-1944. Marc Daniels, Frank Ridehalgh, V. H. Springett and I. M. Hall. 227 pp., illust. 30s. H. K. Lewis & Co. Ltd., London, 1948.

The survey covered by this Report was undertaken to try (1) to determine whether or not it is possible to pick out of large groups of presumably healthy adults those persons most likely to develop tuberculosis, (2) to discover tuberculous lesions at an early stage of development, and (3) to follow the evolution of pre-existing and of fresh lesions. The Report contains the results of repeated Mantoux tests on, and x-ray examinations of, approximately 10,000 young adults, of whom 5,016 were nurses, over a period of years. It reveals that in the groups of young people under review Mantoux conversion and Mantoux reversion rates depended, in goodly measure, on degrees of exposure. It shows that the proportion of young adults in whom tuberculous disease developed while under observation was highest among those who were Mantoux negative and were most exposed to tuberculosis. It reveals that certain factors in addition to those just mentioned—namely, resistance or lack of resistance, of the individual in whom signs of clinically significant tuberculosis were discovered on routine examination—played a part in determining the course of the tuberculous process. The concluding paragraphs of the Report contain a number of recommendations regarding measures considered likely to prove useful in the prevention and control of tuberculosis in certain groups of young adults, namely, contacts to known cases of tuberculosis, medical students and nurses. Most phthisiologists and many internists will find much of value in this Report. It is to be hoped that Prophit Scholars will, in the coming years, be able to pursue their studies on tuberculosis prevention in young adults under more



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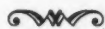
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Physiologic Therapy in Respiratory Diseases. A. L. Barach, Associate Professor of Clinical Medicine, Columbia College of Physicians and Surgeons. 408 pp., illust., 2nd ed. \$10.50. J. B. Lippincott Co., Philadelphia, London and Montreal, 1948.

The author indicates his objective in the following sentence. "The term Physiologic Therapy refers to forms of treatment designed to restore adequate function to organs impaired by disease." After a brief historical account and a review in general of the problem of anoxia the author considers the problem of therapy in relation to distinct disease entities, dealing with each in turn, and under separate chapter headings. By this arrangement an admirable and easy reference work has been produced.

The book however, should be more than a work of reference to anyone interested in the fundamentals of respiratory disease and the principles of its treatment. Because of its clarity of style, its orderly arrangement and its practical appeal it is easily read and easily digested. The bibliography is unusually comprehensive and would, alone, be invaluable for reference purposes.

Symptoms and Signs in Clinical Medicine. E. Noble Chamberlain, Lecturer in Medicine, University of Liverpool. 463 pp., illust., 4th ed. \$7.50. John Wright & Sons, Bristol; Macmillan Co. of Canada, Toronto, 1947.

This reviewer has in the past enjoyed using this valuable popular textbook. It is a pleasure to now review this fourth edition. This book is essentially a clinical study pointing out the various symptoms and signs and attempting to explain them on a physiological and/or pathological basis. Each system is discussed in detail with adequate illustrations to bring home the points made. The book in no way replaces the standard textbooks in medicine, but serves to elucidate the details of clinical medicine that may be glossed over in ordinary textbooks. Revision of such a textbook is necessary as advances in medicine lead to new signs or a new rationale of old signs. Various additions have been made including techniques of various clinical procedures. The chapter on the nervous system is very well clarified with much detail of signs that are forgotten or misunderstood by the practitioner. More attention might have been given to some of the vitamin deficiency states. The chapter on examination of children is written in a refreshing manner. The book may be wholeheartedly recommended to all as a useful book for their library and study.

Textbook of Pathology. W. Boyd, Professor of Pathology and Bacteriology of the University of Toronto, Toronto. 1949 pp., illust., 5th ed. \$10.00. Lea & Febiger, Philadelphia; Macmillan Co. of Canada, Toronto, 1947.

In this new edition of Boyd's well known textbook of pathology there is every evidence of thorough revision. Several sections have been rewritten and new material has been added to others. A number of new sections with new illustrations and one additional colour plate have been introduced. As the author remarks in the preface "some of the more glaring errors have been corrected" but a few new ones have crept in with the new material. For example, the discovery of the diabetogenic action of alloxan is attributed to "Shaw and Dunn"; alloxan is described as "one of the components of uric acid" and is said to produce "complete necrosis of the islet tissue". There seems to be no good reason for introducing the term "Löffler's pneumonia" instead of Löffler's syndrome, especially when the author admits that little is known about the pathological lesions and quotes the findings in one autopsy in which the basic lesions appeared to affect the connective tissues and vascular

tree of the lungs rather than the alveolar parenchyma. However, in spite of the introduction of such debatable issues, the book remains one of the best textbooks of general and special pathology for undergraduate students of medicine. Boyd's "Surgical Pathology" and "Pathology of Internal Diseases" will, no doubt, continue to be of greater value for more advanced study.

Fundamentals of Psychiatry. E. A. Strecker, Professor of Psychiatry and Chairman of the Department, Undergraduate and Graduate Schools of Medicine, University of Pennsylvania. 325 pp., 4th ed. \$4.50. J. B. Lippincott Co., Philadelphia, London and Montreal, 1947.

Apart from revisions of the previous text and slight changes in printing, the additions to this edition are contributed mainly by two new chapters. That on Psychosomatic Medicine has a superficiality that is in keeping with the rest of the book. The other is called Further Thoughts about Nomenclature and Classification. In addition to giving the standard classifications and definitions, this chapter offers a new classification based upon a concept of Reactive Tension said to be tentative and exploratory. The orientation is crudely phenomenological—as if one were to think of all dyspnoeas under one heading—and has no reference whatsoever to dynamics, etiology or treatment. The note is made that these descriptions should make it easier to reassure relatives and patients without upsetting them by use of frightening psychiatric language and without fumbling for euphemisms. It is hard to believe that the author can be so naive as to think that some new classification, if accepted and commonly used, would not come in time to be endowed with the same connotations. This is certainly a sorry excuse for adding confusion to an already confused situation. In effect, though our current knowledge of etiology is small, it represents a step backward: to suggest that the solution for our current confusion in classification is new types of classification is like suggesting that the solution for a drowning man is more water. The volume is still without any references and its neglect of psychotherapy continues.

However, such a book of the *multum in parvo* variety with its condensation, anecdotes, easy eclecticism and simplified expression will continue to be popular, and obviously fills a strong need—however inadequately.

Treatment by Diet. C. J. Barborka. 784 pp., 5th ed. \$11.50. J. B. Lippincott Co., Philadelphia, Montreal and London, 1947.

This outstanding book needs no introduction to the medical profession. It holds a unique place and has held this position since the first edition was published in 1934. The present edition contains a wealth of information not included in the previous editions. It has been thoroughly revised and contains the most recent work in nutrition. It contains the new knowledge of protein and amino acids in diet therapy. The chapters on vitamins are brought up to date and charts listing the various diagnostic aids in determining deficiency states are included with many coloured photographs, demonstrating physical signs in such conditions. A chapter on diet and skin diseases has been added. There are chapters on food allergy, diets in cases with peptic ulcer, colitis, gout, diabetes, anaemia, obesity, etc. The chapters are arranged so that each disease is considered separately. This adds greatly to the usefulness of the book. Under each heading the author gives the principal symptoms of the disease, the important factors in the dietary treatment and finally the diet itself in a simple form.

The author states that the original purpose of the book was to give physicians a simple, crystallized, practical and workable method of prescribing diets and applying treatment by diet to health and diseases. The book accomplishes this purpose. It is recommended to physicians, surgeons, specialists, dietitians and nurses.